CONGENITAL

OCCLUSION AND DILATATION

OF

LYMPH CHANNELS

BY

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TO

THE MEDICAL PROFESSION OF THE D. C.,

WHICH HAS SO FREQUENTLY HONORED ME,

THIS VOLUME

IS RESPECTFULLY AND GRATEFULLY

Dedicated

BY

THE AUTHOR.

PREFACE.

This volume, for the most part the republication of a serial contribution to the *American Journal of Obstetrics*, is the result of an effort on the part of the writer to study and analyze the complex phenomena exhibited in the case numbered 1, in the collection of cases which have been herein comprehended under the general designation—congenital occlusion and dilatation of lymph-channels.

In the execution of this purpose, the writer has mainly confined himself to the study of the subject in its clinical aspects, and of the coarser anatomico-pathological conditions, omitting thus the discussion of questions of minute structure, which are more specially attractive to the student of histology and microscopic pathology. The interest and importance of these researches, especially as regards nosological classification, is fully appreciated, but he must not only plead a lack of technical skill in the use of the microscope, but assert his intention to address himself to the busy practitioner, not as a teacher, but as a compiler—a more laborious, though less meritorious office.

It may be that he has erred in not reproducing the reports of the cases in full. To have done so, would have increased the size of the volume beyond a reasonable limit. In submitting synopses of the collated cases, gathered from the English, French, and German authorities, he has endeavored to supply the description in the language of the reporter or translator, omitting only such portions of the original reports as were deemed unnecessary to the purposes in view. Recognizing, however, the difficulty of presenting the views and correct

meaning of another in one's own language, or even by an honest effort, to eliminate useless verbiage and desultory addenda, it is not improbable that some mistakes have been committed, and, perhaps, injustice done. In only a few instances have the synopses prepared by others been accepted, for it soon became apparent, in the progress of the compilation, that in many cases a comparison of the published abstracts and synopses of previously reported cases presented the history in a different aspect from that which was believed to be a correct representation of the meaning of the reporter. Hence, the synopses—or more properly, abbreviated reports—have been for the most part prepared directly from the original reports.

It may be, that he has erred, also, in introducing cases, which did not properly belong to a collection of cases of occlusion and dilatation of lymph-channels, but he was of the opinion that correlative cases would give additional value to the volume, and as all these cases contributed facilities for the study of the complex phenomena of the case which constitutes the basis of the investigation, he deemed it desirable that all should be reproduced.

Without the opportunities and library facilities supplied by the library of the Surgeon-General's office, through the kindness and courtesy of Surgeon John S. Billings, U. S. Army, the self-imposed task could not have been accomplished, and the writer feels impelled by a sense of justice, as well as by considerations of personal regard, to make ample acknowledgment of his obligations to Dr. Billings and his assistants, Drs. Wise and Fletcher and Mr. Stone.

It may not be inappropriate, in this connection, to relate the following incident, as illustrating the care and diligence which Surgeon Billings has exercised in the collection of this very extensive and valuable library, as well as the completeness with which he has arranged and digested its treasures.

After a laborious and fruitless search for a report of the case entitled, "De Lactis E Scroto Secretione Anomala," the writer called on Dr. Billings, and related to him that the editor of the *Gaz. des Hôpitaux civils et militaires* (No. 127, T. x., 2d Series, Nov. 2 and 4, 1848, p. 508), had stated that after the debate in

the Academy of Medicine on the presentation, by M. Vidal (De Casis), of his case of galactocele. M. Sichel, residing at Zurich, had written to the editor, calling his attention to the above case, which Sichel had witnessed in the clinic of Prof. Schönlein, in 1833, and which Köller had published, with great minuteness, in his inaugural dissertation, but that he could not secure a copy of the pamphlet; that, failing to find a copy in any of the medical libraries in Paris, the editor wrote to M. Lebert, who in his work ("Physiologie Pathologique," T. ii., p. 46, Paris, 1845), had briefly referred to Schönlein's case, which he had also seen at the clinic, in 1833; that in reply, Lebert supplied the editor with a synopsis, which he prepared from his memoranda made in 1833, which was published in the *Gaz. des Hôpitaux.*

After listening to this narrative, Dr. Billings, in a very few moments, placed at the disposal of the writer a copy of the thesis of Köller, written in Latin, and published at Zurich, in 1833. A translation of this thesis, prepared by his accomplished friend, Dr. Murphy, is in the writer's possession, and will be given to the profession at some future period, in an essay entitled, "Lymph Scrotum."

It affords the writer pleasure also to acknowledge his obligations to Drs. Kleinschmidt and Lee, and the late Professor Drinkard. To the former he is indebted for the translations of the cases which originally appeared in the German language, and to Drs. Lee and Drinkard for the French translations. To medical student S. S. Adams, acknowledgment is due for his assistance in preparing the manuscript and in correcting the proof.

To the late Dr. Drinkard, whose untimely death was universally regretted, and whose memory will ever be cherished by those who enjoyed his friendship and confidence, the writer owes more than a mere acknowledgment for assistance rendered. His familiarity with the subject and varied information enhanced the value of his advice, and it is the privilege of the writer to acknowledge the influence of his judicious counsel and constant encouragement when, wearied with the dull and conflicting details, the writer more than once felt tempted to abandon the effort.

To Drs. Mundé and Castle, of New York, and Chadwick, of Boston, acknowledgment must also be made for their courtesy in calling the attention of the writer to cases which otherwise might have escaped his observation.

The illustrations have been prepared from photographs, by Mr. Smiler, Photographer of the Smithsonian Institution, and Mr. Ward, Photographer of the Army Medical Museum, from the original illustrations, many of which have necessarily been reduced in size. The woodcuts were executed by Mr. Nichols. These gentlemen have performed their work with fidelity.

The reader will recognize, from the frequent references to the *N. O. Med. and Surg. Jour.*, that simultaneously with the appearance of the greater portion of this memoir in the columns of the *American Journal of Obstetrics*, there was being published in the consecutive numbers of the former journal an allied contribution, upon the acquired forms of the diseases herein considered. These two essays will aggregate more than 400 pages of printed matter. In addition to this there are at least 100 pages, yet unpublished, which includes the subjects of Lymphorrhagia, Lymph Fistula, and Lymph Scrotum. Recalling the fact that during the past three years, in addition to these 500 pages of printed matter, the writer has examined several hundred volumes and pamphlets, read, and for the most part copied, 3,000 pages of manuscript—and all of this, while never neglecting a busy practice, and for the most part during the hours usually appropriated to recreation and sleep—he feels that he can appeal to his professional brethren for that forbearance, which a generous profession is always willing to accord, and indulges the hope that his shortcomings and mistakes will at least be offset by credit for an assiduous and unremitting effort to contribute something valuable to the common fund of useful information.

THE AUTHOR.

WASHINGTON, D. C., January, 1878.

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INTRODUCTION.

The selection of a title which would convey succinctly and completely the purport of this essay has been attended with serious perplexities. Brevity, always desirable, could not be secured in any single technical word. Lymphangiectasis,[1] employed by Thilesen in 1856, by Petters in 1866, and by Weber in 1872, sufficiently indicates the characteristic morbid condition of their respective cases; but I propose to consider the phenomena of occlusion as well as of dilatation of lymph channels.

When the case numbered one first came under my observation, on the 8th of July, 1874, it was so novel and anomalous to me, that I neither knew by what nosological term to designate it, nor did I appreciate the significance of the associated morbid phenomena. The venous teleangiectasis,[2] and the hypertrophy of the soft and bony tissues were, apparently, obvious enough; but not until it was suggested by Dr. J. S. Billings, did it occur to me that the vesicles were, probably, the dilated extremities of lymph channels. Subsequently, with the assistance of Dr. J. J. Woodward, so kindly proffered, and after a somewhat extended research in the library of the Surgeon-General's office,

[1] Dilatation of lymphatic vessels.

[2] Dunglison, "Dilatation of far or capillary vessels;" Hebra, "A tumor consisting of dilated and newly formed capillaries and finest divisions of cutaneous vessels, and arising in the course of extra-uterine life;" Rokitansky, "A network of enlarged capillary vessels, embedded in a delicate and partly undeveloped cellular tissue, usually congenital, but may be acquired."

I concluded that the case belonged to some one of the forms of congenital elephantiasis; but the manifest and paramount involvement of the lymphatics, together with the further fact that elephantiasis was not a uniform characteristic of lymphatic teleangiectasis, and, like others of the associated phenomena, might be either congenital or acquired, excluded the case from the category of elephantiasis proper; and believing then, as subsequent investigation has demonstrated, that the essential features of the morbid conditions consisted in the occlusion and dilatation of lymph channels, I could not accept the elephantiatic development as the primary and predominating condition.

Desjardins[1] claims, though I think Demarquay is entitled to the honor of first having applied the word lymphorrhagia, signifying "a discharge of lymph from a lymphatic vessel, owing to a lesion of its coats;" but it, like the word lymphorrhœa, signifying "the escape of lymphatic fluid by spontaneous rupture or accidental wound, producing a fistulous opening of the lymphatic vessels," is only applicable to an occasional phenomenon.

Lymphorrhagia has been generally employed to designate those cases in which lymph escaped through a wound, either accidentally or intentionally made, and, hence, may or may not be associated with either dilatation or occlusion of lymph channels. Lymphorrhœa has been usually used to indicate the transudation of fluid through the walls of dilated and distended lymph vessels, and whether it indicates either the escape by transudation,[2] or by spontaneous rupture, it is associated necessarily with either stegnosis or distention, and perhaps with both conditions of lymph channels. In its broadest signification it simply implies the spontaneous flow or escape of lymph, a phenomenon but rarely associated with dilatation and distention of lymph channels.

Angiomata[3] includes "those pathological alterations of the skin which consist either wholly, or in great part, of permanently enlarged and newly formed vessels," and may be "divided

[1] Demarquay's case was published in 1853, Desjardins' in 1854.

[2] Demarquay applied lymphorrhagia to an intermittent, and Zambaco the word lymphorrhœa to a continuous flow.

[3] Hebra, Diseases of Skin, vol. iii., p. 338.

into those which contain blood-vessels and those which contain lymphatics ; " hence lymph-angiomata would concisely indicate such alterations involving the lymph vessels of the skin—a district, in one sense, too limited for our present purposes, and, in another, inviting us into the limitless field of investigation in regard to " newly formed vessels."

Elephantiasis may be either congenital or acquired, and may be associated with lymphangiectasis. Elephantiasis arabum, as defined and delineated by Hebra,[1] presents in the varied aspects of its development, progress, and symptomatology, many features analogous to those presented by occasional cases of lymphatic teleangiectasis. It is essentially an hypertrophy of the fibrous tissue of the cutis and of the subcutaneous connective tissue, affecting primarily the latter, and followed in the progress of further development by an increase in volume of all locally implicated, adjacent organs and tissues, caused by local disturbance of the circulation and chronic recurrent inflammation of the vessels and lymphatics. Some have, indeed, maintained that it was a disease of the lymphatics. Whether viewed as a disease primarily involving the lymphatics, or implicating these vessels only in its development and progress, its objective features are so interwoven with lymphstasis and lymphangiectasis that it is not always easy to determine whether the lymphatics or the connective tissue of the skin was primarily affected, and it is not improbable that occlusion and dilatation of lymph channels may eventuate in the development of elephantiasis arabum.

Virchow has applied the term elephantiasis teleangiectodes, and Hebra[2] the word lymphangiectodes, to a form of congenital hypertrophy, usually occurring in acephalus and other nonviable monsters, and, occasionally, in viable children, which consists in lobulated cutaneous tumors " confined to a few localities or to one region of the body," and involving principally the subcutaneous connective tissue and the blood-vessels of the corium, and which may remain without alteration in size or condition during life, or may become diffused and develop into a monstrous deformity, occasionally involving the

[1] Loc. cit., p. 134.
[2] Hebra, loc. cit., p. 159, vol. iii.

whole or a greater part of the entire body. Notwithstanding the remarkable participation of the blood-vessels in the morbid process, which, if communicating freely and extending into the cutis, may result in the formation of vascular spongy tumors ("lobulated vascular fungus" of Schuh), or by free anastomosis, and amalgamation of the individual blood-vessels form blood cavities (the "cavernous blood tumors" of Rokitansky), the essential histological and clinical features of the affection classify it as a variety of elephantiasis arabum. In this, as in other forms, the connective tissue is primarily affected, and as the morbid growth may predominate in the blood-vessels or in the connective tissue, so will the hypertrophied mass partake of the nature of a true elephantiasis or of a "vascular spongy tumor," or "cavernous blood-tumor." In addition, the manifest evidence of the implication of the lymphatic apparatus is found in the "slits, gaps (Kaposi) cystoid spaces—dilated lymph spaces" observed in the masses of connective tissue; but this pathological condition is not the predominant or characteristic feature, and this circumstance, together with the fact that the manner of formation of the blood cavities or blood spongy tumors is yet in controversy—one view maintaining that they are new growths, and the other that they are the result of morbid changes taking place in existing vessels or structures,—necessarily renders the term inapplicable to the purpose in view, and would extend the limits of the inquiry beyond the prescribed boundaries.

Rejecting, then, these several appellations as inapplicable, for the reasons set forth, and as inadequately expressing the precise purport of this memoir, I have adopted the one upon the title-page, which, I think, conveys to the mind distinct pathological conditions of the lymph channels, and is sufficiently comprehensive to include all that is essential to the study of the nature, etiology, and treatment of those conditions.

While the purpose has been to limit the investigation to distinctly defined conditions of the lymphatic apparatus, the relation existing between elephantiatic development and occlusion and dilatation of lymph channels is so intimate, that it is impossible to draw a line so definite and distinctive as to exclude from consideration certain cases and varieties of elephantiasis; and if such a separation were possible, it would neces-

sarily impair the opportunities for study and the value of the deductions.

Elephantiasis arabum is divided by Kaposi into two forms—Elephantiasis arabum cruris and elephantiasis of the genitals, which are markedly distinct from one another. Further division is made by Virchow, into elephantiasis dura, in which the whole mass of the soft tissues of the affected part seems to be converted into connective tissue, which is not only increased, "but is made up of stiff, glistening, white fibres, and is very firm, almost scirrhous;"[1] and elephantiasis mollis, which is characterized by a uniformly soft and gelatinous condition of the tissues. These latter forms Kaposi insists are not distinct diseases, but simply indicate different consistencies of the hypertrophied structures. E. A. C. is a local disease, affecting isolated portions of the body, more rarely symmetrical parts, usually confined to one or both legs, most frequently to the right. Its immediate cause is an inflammation of the derma, involving the blood-vessels and lymphatics or primarily the lymphatics, accompanied with effusion and resulting in hypertrophy, primarily beginning in the subcutaneous connective tissue, which may extend to and involve all the constituent soft tissues of the affected part and the bony structures. The fluid effused is believed, by Tilbury Fox, to be lymph, and by Kaposi to be a fibrinogenous substance, possessing a quantity of formed elements like those of lymph. It coagulates on exposure to the air, and when first effused is slightly milky. Containing formed cells in great abundance, which are the most important material for the production of new connective tissue, it is readily understood why the hypertrophy commences in that tissue. The effusion is the result of the occlusion or obliteration of the lymphatics, consequent upon the inflammation; and though there is a contrariety of opinion in regard to the condition of the lymphatics, it is generally conceded that the lymphatic vessels and lymph spaces are dilated, and in them, lymph, rich in connective-tissue-forming elements, is stagnated. In the midst of the newly formed and dense connective tissue, cyst-like spaces filled with nutritive plasma, are not infrequently found, which are believed to be cystic dilatations of lymphatic vessels. Occa-

[1] Hebra, loc. cit., p. 140.

sionally vesicles are formed upon the surface of the hypertrophied part, containing a clear or milky fluid, which, escaping by puncture or spontaneous rupture, coagulates on exposure to the air, and is believed to be lymph. The vesicles are the dilated extremities of lymph channels. The blood-vessels, especially the veins, are involved in the morbid process. They are more numerous and of larger calibre, with sometimes thickened and sometimes thinned walls, and occasionally the smaller become occluded with coagulated fibrin.

In elephantiasis of the genitals, erysipelatous and lymphangiotic attacks of inflammation have been very rarely observed, never in cases attacking the scrotum; yet the macroscopic and microscopic observations are analogous to those of E. A. C., and find their cause in long-continued stagnation of the lymph in the interstitial lymph spaces. It is only during the later stages that the hypertrophied and dilated lymphatics rupture and lymphorrhœa takes place, and, as in E. A. C., cyst-like lymph spaces are found.

It must therefore become manifest that, to completely grasp the issues involved, certain cases, though not presenting the uniform clinical and pathological characteristics of elephantiasis arabum, are certainly well-defined instances of some form of the disease, and cannot be excluded from consideration in connection with an investigation into the causes and nature of occlusion and dilatation of lymph channels. To these have been added a number of cases of congenital giant growth, with the view to more clearly illustrate some of the anomalous features presented by some of the cases, and to complete the opportunities for the study of the subject.

CONGENITAL OCCLUSION AND DILATATION OF LYMPH CHANNELS.

These abnormalities present themselves in various forms, and in association with very varied conditions of tissue development; usually they are complicated with some one of the many varieties of so-called congenital elephantiasis, which may be either a concurrent or consecutive phenomenon.

Congenital elephantiasis may involve an entire extremity, or may show itself at many places (Virchow) of the surface of the

body, either in the form of regular enlargements, involving a portion of an extremity or of the trunk, or in the form of tumors, either solid or cystic, "rising in larger or smaller masses upon the surface of the skin."

Elephantiasis arabum is a condition which regularly commences with inflammatory processes, similar in character to erysipelas, in which the lymph vessels participate, and consists in the development of connective-tissue masses, which originate in the interior of the affected parts, and proceeds from a hyperplasia of pre-existing connective tissue. The condition of the newly-formed connective tissue varies, and Virchow distinguishes, according to its greater or lesser density, elephantiasis dura and elephantiasis mollis.

For the most part the congenital forms belong to the variety of elephantiasis mollis, which, when carried "into after-life, is always partial, and does not present that lardaceous, tendinous hardness"—sclerosis, which belongs to the acquired forms. In such cases the principal seat of the change is usually in the subcutaneous tissue, and the result varies according as the morbid alteration begins sooner or later in the intra-uterine life. If the fat-tissue (Virchow) has already been developed, the appearance is not unlike a polysarcia; if the change begins when the mucous tissue still lies under the skin, then a more or less loose, soft, sometimes gelatinous, tissue continues to exist.[1] There are also other peculiarities which belong to the congenital forms of elephantiasis mollis. The parts imbedded in the connective tissue undergo hyperplastic development, and the morbid process may involve the vessels, nerves, muscles, and even extend to the bones. The blood-vessels, most usually the veins, and the lymphatic vessels, may reach a colossal development, the enlargement taking place both in length and breadth, forming, occasionally, a varicose network, or a rosary-like dilatation, or presenting a cavernous condition.

Not infrequently, in the congenital forms, the tumors, nodes, and enlargements present a cystic formation, which Virchow and Billroth[2] maintain proceeds from dilated lymph channels, though it is not always easy to trace a direct connection. These cysts or caverns contain a lymphoid fluid which, microscopically

[1] Virchow, Onkologie, vol. i., p. 316.
[2] Beitrage zur Path. Hist., p. 215.

and chemically, so closely resembles lymph, in all its essential characteristics, as hardly to admit of any doubt of their origin in dilated lymph vessels or spaces.

The purpose here is to group together all such cases of congenital elephantiatic development, co-existing with cystic or cavernous formation, and such other congenital cases as more distinctly exhibit, primarily, abnormalities of lymphatic vessels, with the view of studying the condition of the lymphatic channels and the relation which such alterations bear to the associated tissue changes.

Case I.—On the 8th of July, 1874, I was called to see an infant, four days old, presenting a form of congenital disease, as hereafter described.

O. K., the father, aged 37, a strong, healthy, but not a robust man, of sallow complexion, had enjoyed excellent health all his life, excepting an occasional attack of intermittent fever, and a single attack of gonorrhœa, five years previously.

The mother was 26 years old; always healthy, robust, short stature. Had borne four children, three by the present husband, one of which died at the age of six months of "summer diarrhœa." The three living children were aged, respectively, five years, two years and six months, and the infant, the subject of this report. The two older children were healthy, well grown, robust, and represented by their parents as having been healthy from birth. No traces of syphilis, either in the parents or children, could be discovered. Both parents white; the mother Irish and the father of German descent.

The infant was born at full term, after a brief labor, unattended by any unusual occurrence. The colored midwife, in attendance, informed me that the presentation was head, and the cord was not wrapped about the neck or lower extremities of the child.

At the time of my visit the mother was doing well, and had a remarkably favorable puerperium. She worked much during her pregnancy on a sewing machine, using the right foot on the pedal, to which circumstance she attributed the affliction of her infant; adding, as a confirmation of her theory, that during the latter months of her pregnancy her right leg (corresponding with the diseased member of the child) was much swollen, and about which appeared several purplish spots. At the time of my visit the swelling had disappeared, and the purplish spots were recognized as very slightly varicosed veins.

The infant, excepting the anomalous condition hereafter to be described, seemed well, slept well and quietly; nursed; bowels acted naturally; passed water as is usual. The cord separated on the fourth day, stump healthy; color of skin natural; tongue clean; cry not peculiar; pulse, counted during sleep, 120; respiration natural, quiet, and easy; inflation of lungs complete; temperature in rectum 98.4.

The comparative sizes of the sound and diseased leg are very distinctly brought out by inspection of figures 1 and 2. The following measurements were taken August 2, 1874:[1]

Healthy leg at groin, 7½ inches; at calf, 5 inches.
Unsound " " 11½ " " 7 "

No difference in length. The hypertrophy on the inside began at and involved the right pudendal labium, and extended throughout the leg, but proportionally less in the foot. The folds of the soft parts, with the flexures dipping deep towards the bones, with their surfaces closely coaptated, as if firmly pressed together, are well represented in Fig. 1. These folds, like the other portions of the

FIG. 1.—Represents the inner aspect of the right leg.

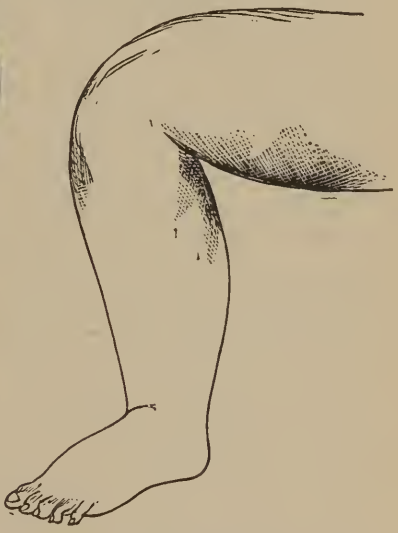


FIG. 2.—Represents the left or sound limb.

soft parts, yield a firm, inelastic sensation, neither indurated nor œdematous. Firmer than normal flesh of so young an infant. The partial sclerosis is uniform, and invades all the constituent tissues of the soft parts. The covering integument of the folds, as it is of the entire limb, excepting as hereafter described, is in appearance normal. It cannot be pinched up, and is less movable than the natural skin

[1] Those taken July 8th lost, but believed not to differ materially.

over other parts. Does not pit on pressure; to a limited degree scleromatous, but not presenting the horny hardness, smooth, shining. yellowish or waxy hue, dense and parchment-like feel, and diminished temperature so characteristic of scleroderma. There is no dermatolysic growth. At the base of the third flexure—the only one

FIG. 3.—Represents the outer aspect of the diseased leg.

below the knee—is seen a projecting body, which seems pendant from the apex of this flexure; but this is the vesicle represented at the base of the third flexure (see Figs. 1 and 3), as seen on the inside of the leg, and second as seen on the outside.

The external edges of this flexure (second on outer aspect, see Fig. 3) are separated by the thin bevelled edge of a fleshy fold, which gives it the appearance as if two flexures (the middle and third on the inside) had terminated in one on the outside.

Immediately anterior to the third flexure (Fig. 1), near its apex, and midway between this point and the anterior margin of the tibia, is situated a nipple-shaped tumor, and farther toward the same anterior margin, and approaching nearer the knee-joint, another is located, similarly shapen, but less globular, with several depressions near its apex, at the bottom of each of which is a minute bluish-colored spot. Both these tumors are covered with the epidermis and cutis vera, are of a pale bluish-white color—the blue tinge deepening at several points, thus presenting indistinctly the appearance of a superficial vein. These bodies are near the size of a female nipple; contain fluid, which can be pressed from them, but they refill immediately upon the withdrawal of the pressure. Farther up the limb, on the inner aspect of the knee, between the patella and the apex of the middle flexure, is located a subcutaneous cyst[1] (see Fig. 1), measuring one inch in diameter at base, and three-fourths of an inch from apex to base, movable to a limited extent, and covered by normal skin,

[1] At my visit, August 2d, accompanied by Dr. J. J. Woodward, neither of us could discover any trace of this cyst-like body.

which slips easily over and about it. It cannot be diminished by pressure. The small dark spots between the middle and third flexures and the nipple-shaped bodies, those below the third flexure, and the one below the tarsal flexure, are, in the living subject, bluish-colored puncta, like venous blood seen through a thin and anæmic integument.

The tibia appears very much enlarged and illy-shapen; the femur seems natural in size. All the joints are normal, though the ankle, in consequence of the hypertrophy of the surrounding soft tissues, and, in a measure, due also to the enlargement of the tibia, presents an awkward appearance, looking as if the bones of the leg were dislocated backward from the tarsal articulation; but a careful examination of the joint failed to discover any abnormal condition or location of its articulating surfaces. The motions of the limb are perfect; the child moves both limbs alike, and does not manifest pain from manipulation.

On the outer side (Fig. 3) the hypertrophy commences at the small of the back, extending downward, but not crossing the spinal column, and involves the entire right buttock and right side of the leg. In this figure the anterior margin of the limb, and the awkward appearance of the ankle, are accurately drawn. The spot just above the apex of the second flexure is a superficial nævus; another, larger, is located higher up on the right buttock; a third, still larger, is situated just below the second flexure on the calf, and a fourth on the antero-lateral aspect of the ankle. The ends of the third and fourth toes are purple colored.

The middle fold presents a broader apex surface, and the third is absent from this view. The flexure below the knee does not appear on the outside as a distinct one.

Below the middle flexure (second, as seen in Fig. 3), on the outer and posterior surfaces of the right calf, is a cluster of vesicles—bladder-like, varying in size. (Fig. 4.) The largest is not greater than the end of the little finger. One is located in the centre of the nævus, and others around its border. All these vesicles are covered with epidermis distinctly marked with minute ramifying venous radicles. These vesicles, including the one rising through the centre of the nævus, are semi-translucent; contain a serous colored fluid; can be inverted by very gentle pressure; communicate one with another and apparently with a subcutaneous cavern. When any one of them is emptied and its investing epidermis is inverted, by pressure, one or more of the remaining filled vesicles become fuller and tense with the accumulated fluid. Upon removal of the pressure the emptied and inverted vesicle refills and gradually returns to its previous condition and form. When inverted the sensation of a circular firm rim, with a well-defined sharp edge, is communicated to the touch. No communication exists between these vesicles and the nipple-shaped tumors on the

Fig. 4.

inside of the leg. The fluid in the vesicles is serous. About this group of vesicles, especially along the margin of the inlying nævus, are a number of very small purplish puncta, and many cicatricial-looking spots, which the attending midwife alleges were vesicles, like those above described, but now emptied and contracted. She claims to have counted forty vesicles immediately after birth; but both statements are discredited. Above this group of vesicles, nearly midway between them and the outer margin of the patella, a large vein, represented by the dark wavy line in the cut, approaches the surface. To the touch it feels like a groove, with distinct and firm edges. No communication can be made out between it and the nipple-shaped bodies.

Nov. 4th, 1874.—The child has continued to enjoy, uninterruptedly, good health; has not been sick a day since its birth. To-day, four months old, it weighs seventeen pounds; is bright, playful, and hearty.

The measurements of the limbs are as follows;

	Right.	*Left.*
Around calf, ...	9½ inches.	6¾ inches.
Thigh, upper fold, ...	14 "	10 "
Ankle, ...	7¾ "	4½ "

Right leg one-half inch longer than the left.

April 4th, 1875.	*Right.*	*Left.*
Around calf, ...	11 inches.	6¼ inches.
Thigh, upper fold, ...	16 "	11½ "
Ankle, ...	9 "	4½ "

April 4th, 1875.—Right leg one inch longer than left; right foot one-half inch longer than left; two teeth. Healthy, thin. Hypertrophied parts, soft, flabby; integument less firm. Mother menstruating regularly since November. Child passes an unusual quantity of urine.

In the foregoing description I have endeavored to correctly represent the coexisting morbid phenomena presented by this somewhat remarkable case, as they were observed during the lifetime of the unfortunate child. The subsequent details of the post-mortem examination will not verify these observations in every particular.

During the winter of 1874–75 the child suffered severely from a protracted attack of whooping-cough, which only entirely disappeared during the milder spring weather, leaving no other effect than loss of strength and some emaciation. During the ensuing months of May and June she suffered from several attacks of catarrhal diarrhœa, followed by increased debility and emaciation. These diarrhœal attacks were always accompanied with marked diminution of the size of the diseased limb; the buttock and lobular masses became much softened, and the thickened integuments flabby. In the early part of July, after having been improperly fed upon blackberries, she was seized again with diarrhœa, more severe than any preceding attack, which resisted treatment, increased in intensity, and soon eventuated in

entero-colitis, marked by stools varying in frequency and consistency, more or less mixed with blood, straining, abdominal tenderness, fever, and prolapsus ani. Occasionally the dejections were exclusively blood, never exceeding in quantity a drachm, though during several days this quantity was evacuated several times.[1] Her appetite continued moderately good. With intervals of apparent improvement, succeeded by more aggravated symptoms, she continued to suffer, losing strength and emaciating rapidly until August 12th, when she sank into collapse and died, aged one year, one month, and eight days.

Autopsy forty-eight hours after death.[2] Body very much emaciated, no cadaveric rigidity. Eight incisor teeth, anterior fontanelle very large.

Measurements.	*Right Leg.*	*Left Leg.*
From anterior superior process of ilium to middle of patella, . .	7 inches	$6\frac{3}{4}$ inches.
From middle of patella to internal malleolus, ...	6 "	$5\frac{5}{8}$ "
" to external malleolus of right leg,	$6\frac{1}{2}$ "	
Circumferences.		
Middle of thigh, ...	7 "	$5\frac{3}{4}$ "
Buttocks, ...	$12\frac{1}{2}$ "	$7\frac{3}{4}$ "
Knee, ...	8 "	6 "
Calf, ...	8 "	$4\frac{1}{2}$ "
Malleoli, ...	$5\frac{7}{8}$ "	4 "
Tarsus, ...	$4\frac{7}{8}$ "	4 "
Length of foot, ...	$3\frac{7}{8}$ "	4 "
Length of cadaver from occiput to the plantar surface of heel, . .	$31\frac{1}{4}$ "	30 "

The following cut (Fig. 5) is from a photograph of the dismembered limb, and exhibits the relative shrinkage of the hypertrophied parts. The covering integument of the buttock hung in large flabby folds, which could be raised and moved as if unattached to the subjacent tissues. Beneath were several empty caverns, varying in size, and lined by an irregular jagged surface, seemingly made up of very small fat globules, thickly interspersed with minute cysts, mostly not larger than a pin's head.

Several times during the progress of the intestinal disease, and once previously, following what she considered a very copious diuresis, the mother called my attention to the apparent diminution of the rump and to the looseness of the skin, which led me to suspect the existence of lymph caverns. The sensation in several places was different from that of a solid mass, but at no time could I detect fluctuation or cause diminution by firm and continuous pressure.

[1] I suspected, from the repetition of this hemorrhage, some abnormal condition or arrangement of the pelvic blood vessels, but none was discovered.

[2] Present, Drs. Drinkard, Lamb, Healey, and Kleinschmidt.

The measurements last given were made from the limb as shown in Fig. 5.

Heart, lungs, liver, kidneys, and spleen healthy; stomach filled with a whitish gruel-like fluid; mesenteric glands enlarged; blood-vessels of mesentery engorged. Peyer's patches were enlarged; follicles distinct and prominent. In the large intestines, the glands were ulcerated, intestinal walls large and translucent.

On the right side, extending from the fourth lumbar vertebra (displacing the right kidney, pushing its convex outer surface up against

FIG. 5.

FIG. 6.

the liver, into the under surface of which the kidney has made a marked depression) was found an extra-peritoneal tumor, which filled two-thirds of the false and true pelvis. This mass appeared like a number of the convolutions of the large intestine agglutinated together and in a gangrenous condition. It was firmly attached to the bodies of the lumbar vertebræ, fascia of right psoas muscle, along the crest of right ilium and right horizontal ramus of the pubis, to the fascia of the false and true pelvis and to the perineum. The cæcum

was displaced to the left side, and the rectum pushed far to the left of the median line. Uterus and bladder normal, and in natural position. Right ovary lying upon the anterior surface of tumor, attached to it (but not fixed) by the broad ligament, between the layers of which the tumor seemed to be.

This tumor, as imperfectly shown in Fig. 6, consisted of five cysts, each containing a thick brownish-red fluid, composed of blood corpuscles, granular matter, and débris. Three of the cysts communicated through apertures in the intervening septa, the other two were completely closed. The communicating cysts were emptied of their contents and filled with quicksilver, and the non-communicating were treated in a similar manner, without discovering any connection with the adjacent parts. The blood-vessels in the neighborhood of these cysts were tied above and below and injected with quick-silver, but no communication could be discovered between the cysts and any of the vessels. Their walls and the intervening septa were composed of dense fibrous tissue, and the anterior surface of the mass was covered by the peritoneum. None of the cysts were separate and distinct, but so arranged that a portion of the membranous wall of each was common to two or more cysts. These cysts are believed to be devastated lymphatic glands.

The skin covering the hypertrophied parts was everywhere thickened. The subcutaneous connective tissue was vastly increased, contained but little fat, was wide meshed, with very many small cysts, some as large as a pea, filled with a serous fluid. Between the skin and superficial fascia, in several places, were smaller or larger cavities, containing clusters of small serous-like cysts, in every respect like those found in the meshes of the subcutaneous areolar tissue. One of these cavities, about the size of a filbert, was found in the locality of the cyst-like body on the inner aspect of the knee-joint; upon the fascia forming its base was a thick layer of dark pigment.

The muscles of the thigh and buttock were pale and flabby, and everywhere in the inter-muscular connective tissue, varying in size from a pin's head to a pea, were to be found the serous cysts. The muscles of the leg were of a deeper color and appeared normal. They were not atrophied. The arteries and nerves were natural. The veins on the outer and posterior aspects were hypertrophied—the external saphena, before referred to as the dark-bluish wavy line on the outer side of the knee, was very large. From it a large branch ran to the large nævus about the cluster of vesicles, and there subdivided into a number of minute branches. The posterior tibial was as large as a goose-quill, and, in the immediate vicinity of the nævus at the ankle-joint, divided into a number of smaller branches. From it extended a branch as large as a crow's quill along the dorsum of the foot, sending large branches to the third and fourth toes, which were discolored.

The vesicles contained a serous-like fluid. From one the pouch-like covering was removed, and in the base two small openings could

be seen with the naked eye, through which a lymph-like fluid could be pressed. One of the vesicles was incised, and into it a small funnel was inserted and secured, into which quicksilver was poured. All of the vesicles, with a single exception, quickly filled with the metal, and a number of the cicatricial spots developed into vesicles filled with the metal. From the same reservoir of metal the lymphatic vessels were injected; one dipping down between the muscles terminated in a dilated pouch-like sinus, another followed the course of the posterior tibial vein, sending off numerous branches along its course; and a third, probably the same trunk, ran upwards, but could not be traced far above the knee in consequence of the previous dissection of the parts above. No communication between the superficial and deep-seated lymphatics could be anywhere discovered—none of the latter being injected with the metal.

After the most careful examination we failed to discover either the receptaculum chyli or the left thoracic duct.[1] Portions of the subclavian and jugular veins were removed and carefully examined subsequently, but no vascular connection could be recognized as the left thoracic duct. The right duct emptied into the right subclavian vein.

Beneath the nipple-shaped bodies, in the superficial fascia, was found a spongy vascular tissue, which extended into the bodies, seeming to compose the entire mass, except the covering integument. The bluish-colored puncta, before described, were the terminal dilated ends of venous radicles.

Figure 7 represents a vertical section of one of these bodies. Microscopic examination by Dr. McConnel. It shows a central sinus, which in the recent state contained blood, clots of which may be seen represented upon different parts of the wall. Surrounding this is well formed connective tissue, exhibiting no evidence of any inflammatory process; other views of the same section exhibited here and there small clots of blood completely walled in. Mucous tissue was also to be seen. The sub-papillary layer of the skin was exceedingly vascular, and the sweat glands were enormously hypertrophied.

Figure 8 represents a microscopic section (vertical) of the integument covering one of the vesicles. These vesicles were simply pouches of skin containing lymph, their walls consisting of nothing (McConnel) but the components of the skin, with here and there newly formed connective tissue which encroached upon the cavity.

The tibia was very slightly, if any, enlarged. The articulating surfaces were normal.

The discrepancy in the measurements of the foot are due to the fact that in one instance the measurement is made from the posterior surface of the fat cushion on the plantar surface (see Fig. 3), and in the other instance from the posterior surface of the heel proper.

[1] This dissection was made under unfavorable circumstances. The portion of the body represented in Figures 5 and 6 was removed and examined after several days' immersion in alcohol.

FIG. 7.

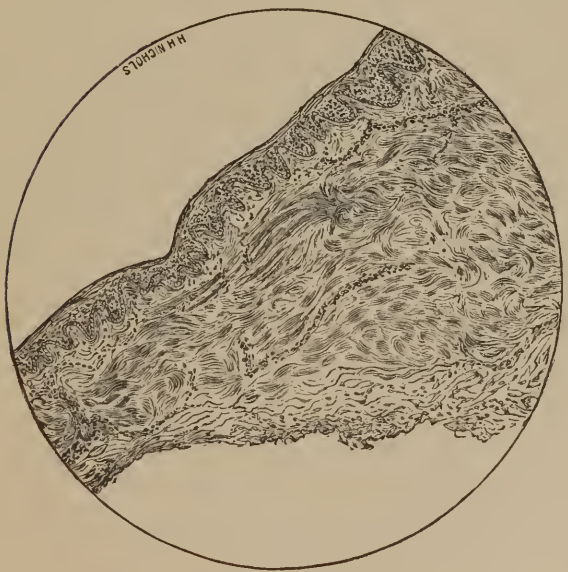


FIG. 8.

I have failed to find any record of a case precisely similar, in all of its features, to this anomalous one; but a number of cases have been published, both congenital and acquired, presenting one or more of its phenomena. By applying the information to be derived from an examination of the reported cases, a satisfactory explanation of all the abnormal conditions may be reached. This method of study will involve the grouping together of the cases illustrating particular phenomena, and though the special inquiry relates to congenital conditions, it will be necessary, occasionally, to amplify the illustration, to introduce into the group instances of the acquired forms.

The feature which first attracts attention is the extraordinary enlargement, and the singular preservation, in such a marked manner, of the natural flexures of the skin and subcutaneous adipose tissue. The natural furrows and indentations of the covering integument are usually exaggerated in similar hypertrophic developments; but this peculiar arrangement of the enlargement only finds its analogy in the case, reported[1] by Thomas Chevalier, of "extraordinary enlargement of the right lower extremity," following an attack of phlegmasia alba dolens.

Case II.—Sarah Rogers, aged 46, had suffered with a continuous enlargement of the right leg, until finally it became so unwieldy as to prevent locomotion, yet the knee and ankle-joints retained as much flexibility as the enormous increase of substance surrounding them would admit; motion was painless. The cut (Fig. 9) exhibits on the outer aspect of the limb the lobules separated by the furrows.

Autopsy.—Hypertrophy confined to skin and fat tissue; muscles slender and pale; bones and joints unaffected; arteries not enlarged; no change in the inguinal or pelvic glands detected. The cutaneous papillæ on the foot were enlarged and elongated into pendulous cones rounded at the end, each being supplied with an artery which terminated "in villi upon its surface."

The development involved the greater part of the thigh and the entire leg and foot. It followed an inflammatory process; was attended with a "copious and exhaustive transudation of serous fluid from the surface of the hypertrophied part," and it is probable that the fat masses were interspersed with minute inter-communicating cavities filled with similar fluid.

Somewhat similar, though less extensive, was the "enlargement of the left lower extremity," in the following case, Fig. 10.

[1] Med. Chir. Trans. Lon., vol. ii., p. 63, 1817.

Fig. 9.

Case III.[1]—A young man, aged 25. The limb measured below the knee two feet nine inches in circumference; had attained its size very slowly and gradually, unattended with any pain or inflammation of the skin, the subjacent adipose tissue, or of the inguinal glands. The swelling involved the lower half of the thigh, leg, and foot; on the foot, as in Chevalier's case, it overhung the toes. Below the knee the enlargement was divided into lobes by deep fissures. On the thigh, above the swelling, the skin was loose and flabby; below it was thickened and scaly; in the fissures the cuticle was very thin and the skin was reddish and constantly moistened with fluid, great quantities of which were discharged. Both the knee and ankle-joints retained their flexibility. He could walk and run. Non-congenital.

Fig. 10.

Case IV.[2]—A. C., æt. 52. In her sixth year suffered from ophthalmia, from twelfth to fourteenth year from spondilitis lumbalis, resulting in kyphosis of lumbar vertebra, unaccompanied by paralysis. In her nineteenth year the affection of the left leg began, with violent burning pains night and day, followed soon by the appearance on the skin of the foot and leg of closely arranged, translucent vesicles, not larger than filberts, and hemispherical, which disappeared without rupture, leaving white spots. From this time the leg began to enlarge, and from several cracks in the skin a large quantity of a clear serous fluid exuded. These openings closed in six weeks, and subsequently the integument of the leg was repeatedly attacked with an erysipelatous inflammation, attended with rigors and loss of appetite. After each of these attacks the leg became larger, nodular projecting tumors and deep transverse sulci formed. Later a large abscess formed on the anterior surface of the leg, which opened spontaneously and discharged a large amount of black, stinking blood and pus, and then the thigh began to enlarge. Four years after, at the time of the ligation of the femoral artery, the measurements of the circumferences were as follows, in centimetres:

	Right.	*Left.*	*After ligation.*
Foot at base of toes, ...	24	25	23
Middle of foot, ...	22½	30½	26
Around malleoli, ...	23½	32½	27½
Middle of leg, ...	31	45½	33
Knee, ...	33	47½	34
Middle of thigh, ...	47	54½	40

[1] R. J. Graves, Dub. Hosp. Rep., vol. iv., p. 521, 1827.

[2] Kappeler, Chirurg. Beobacht. aus dem Kantonspital Münsterlingen, p. 260, 1865, 1870.

This reduction had been gained in six months, and remained the same four years afterward, in 1874.

Case V.—J. P.,[1] æt. 28. With the exception of an attack of typhus fever in his twentieth year, had enjoyed good health until six months previous to admission to clinic, when he had accidentally cut the sole of his foot, which apparently healed without trouble, but was followed in two weeks by a painful abscess, and afterward by a fever which lasted several weeks. Then the leg began to swell, and numerous abscesses formed on the dorsum of the foot and leg, which healed slowly. Four years after, the affected parts had reached the enormous size shown in Fig. 11, and appeared like a truncated cone, composed of three tumors, the upper one resting upon a deep furrow encircling the ankle-joint, another surrounding the heel like a horse-shoe, and a third arching across the tarsus and extending to the toes. In the horizontal posture the tumors became softened and flaccid; when erect they became hard and tense. The inguinal glands were swelled and hard, and a systolic murmur could be heard in both extremities from the inguinal fold to the apex of the inguinal triangle.

Fig. 11.

Anatomical examination of the amputated limb.—The superficial and deep veins, which communicated by numerous branches, were dilated; the saphena by varices of walnut size, and, in the territory of the tumors, by larger sacs filled with dry plugs adherent to the walls. The walls of the larger veins were thickened, did not collapse on section. The nerves were thickened, the neurolemma injected.

The hyperplastic integument was thickened, covered with a bristly epidermis, and when incised discharged copiously a clear fluid, which, after standing, loosely coagulated. The upper tumor posteriorly was abundantly supplied with fat; anteriorly it was mostly composed, as were the other tumors, of a white tendinous callous tissue, which fused with a thickened and vascular periosteum. The tibia anteriorly was covered with osteophytes; its cavity was mostly ossified and filled with a reddish marrow. The hair follicles and sebaceous glands were atrophied; the latter everywhere were filled with cells under-

[1] Prof. A. Bryk, in Cracow. Oester. Zeitschr. für pract. Heilkunde, vol. xv., No. xi., p. 325. For the opportunity of examining the reports of Prof. Bryk, I am indebted to Dr. Jacobi, of New York, who kindly placed at my disposal the number of the journal above referred to.

going fatty degeneration. The sudoriferous glands were in sparse groups and atrophied.

The single fat lobes of the calf-tumor were surrounded by a fibrous capsule, which sent processes between the smaller lobes and spread between the single fat cells in the form of a regular network of anastomosing nucleated spindle cells, in the meshes of which the fat cells could be recognized. With increasing density of the connective tissue the fat contents of the mesh-cavities decreased and the fat cells became smaller. All the transitions from the soft fat lobules to the sclerotic fibroma—only containing fibrous trabecular tissue, but always preserving the areolar character—could be traced.

The lymph vessels were very numerous, dilated, and formed nets with mesh spaces. The vascular periosteum was attached to the bone by an osteoid layer. The bone in places was hardened.

Fig. 12.

Case VI.—A fœtus,[1] between the fourth and fifth month, weighing two hundred and fifty grammes, and measuring in length eighteen and one-fourth c.m., and around the thorax fourteen. The tumor, as represented in Fig. 12, occupies the entire vault of the cranium and parts of the face and neck, extending like a cape from the edge of the scapulæ across the neck, over the vault on both sides as far as the root of the nose. Below the superciliary ridge it extended in a curved arch to the corners of the mouth and to the chin. At the edges of the scapulæ and on the neck and sinciput it could be raised from the subjacent tissues. By furrows it was divided into a frontal, temporal, facial, and neck lobe. In the furrow separating the neck and facial lobes the ears can be seen unconnected with the tumor. Along the saggital suture a furrow separates it into symmetrical halves. No other abnormities, excepting thickened lips, and a thickened, soft integument, marked by numerous rugæ and folds, was discovered. The cranial lobes were firmly attached to the bones, and the frontal and cheek lobes were softer than the neck lobes. The tumor mass was thickly interspersed with minute caverns, and had its origin in the cutis and subcutaneous tissue, and consisted mostly of connective tissue of varying density, rich in cells and abundantly supplied with vessels. The cells were principally the spindle and stellate forms. The fibres of the basic substance were curiously and variously interwoven, forming irregular fissures. These and the

[1] H. Steinwirker, Dis. Inaug., Halle, 1872.

caverns were lined with endothelium and either empty or filled with a coagulum enclosing lymph corpuscles. The blood-vessels were very numerous, interrupted with frequent varicosities and densely filled with discolored, brownish-yellow discs.

The following analagous case, reported by Meckel,[1] exhibits a different arrangement of the masses, and caverns of pea size and larger:

Case VII.—A six-months, fœtus,[2] male. Entire head covered with a fleshy, spongy lump, which extended anteriorly, hiding the face, down to the chest, and stood out in sharp outline from the latter. The integument of the face, ears, extreme points of the fingers and toes, was fine and smooth; the rest of the skin showed gelatinous softening and augmentation of substance, and was interspersed with numerous caverns, some collapsed and others filled with lymph. At the points of the fingers and toes the transition of normal to abnormal integument was imperceptible; at the face, however, it was bounded by a fold-like reflexion. The line of demarcation passed over the lower part of the forehead down to the ear, then closely behind the latter downward and forward to the lower edge of lower maxilla, and around the mouth. At all these points the delicate integument suddenly passed into the enormous mask-like integument. The largest sac-like tumors were over the cerebral portion of the head and in the lumbar region. The skeleton was regular in form; bones, however, thin and cartilaginous.

The firm, painless, non-compressible and non-fluctuating masses, separated by furrows in the integument, which mark the flexures of the skin and the ordinary form of development of the panniculus adiposus in the thigh of the newly-born, are mainly composed of fatty and connective tissues. The formation of these fatty enlargements into lobules, masses, or folds, not unlike, objectively, lipomatous developments, is in a measure due to that peculiar and normal anatomical arrangement and structure of the connective tissue of the skin which at the natural flexures and furrows is either directly connected with the superficial fascia, or there is at such places but very partial formation of the panniculus; and consequently, if any, far less and much slower accumulation of fat along the course of such furrows or indentations. In Chevalier's case and in my own, as is usual in similar cases of hypertrophic

[1] Archiv f. Anat. and Physiol., 1828, p. 149.
[2] Cited by Steinwirker, Dis. Inaug., Halle, 1872.

development, the skin was much thickened, hardened, and firmly attached to the subjacent tissue. In the latter case the hyperplasia and condensation of the connective tissue, which imparted to the skin its abnormal firmness and immobility, was also exhibited in the firm, sharp edges of the circular openings through the cutis vera, through which the fluid escaped into the cuticular vesicles and in the groved character imparted to the superficial vein on the outer aspect of the limb.

In those cases where the hypertrophy is associated with concurrent and recurring attacks of erysipelatous inflammation, the enlargement is probably circumscribed by the limits of the inflammatory processes. The extension of erysipelatous inflammation may be limited or hindered by the increased thickness and firm attachment of the skin to the underlying structures, as about joints and along superficial bony margins, also by the borders of portions of the integument where the direction of tension changes—the track of extension being usually in direction of the greatest tension of the portion affected. The extension may also be hindered by the natural flexures of the integument. It is, nevertheless, true that the panniculus adiposus, in its normal physiological development, presents a more or less lobular structure and formation, and when, as in Case 1, the enlargements are defined by the outlines of the natural arrangement of the lobular structure of the panniculus, it is more than probable that the hypertrophy is simply an exaggeration of the normal physiological development.

The foregoing examples of the division of the abnormal enlargement into lobes by deep furrows exhibit no general law governing such formations. It is found in both the acquired and congenital forms, and in cases in which the hypertrophy is limited to the integument, as well as in those cases in which the subcutaneous cellular tissue and panniculus adiposus are involved. The joint-flexures are exempt or but partially invaded, and flexibility is only disturbed by the mechanical obstacle presented by the size and close apposition of the masses. In the case of cranial tumor (No. 6), the furrows corresponded partially with the course of the sutures, the neck lobes were apparently limited above and below by the integumentary furrows formed by the lateral flexion of the head upon the neck and of the neck upon the trunk, and in front by

the trachea. In neither of the acquired cases where the foot was involved, was the plantar surface invaded. In those cases, among the acquired forms, where the disease began in the thigh or leg, and subsequently extended, sometimes after a very long interval, to the leg or foot, the extension was not by continuity, but by separate invasion of the parts above or below the neighboring joint. These circumstances would indicate that the localities of tendinous and aponeurotic attachments, where the fibro-areolar fascia is less abundant, or nearly absent, as in the plantar and palmar surfaces, and where the deep fascia, an inelastic and less yielding membrane, serves the purposes of insertion and protection, were less favorable for such developments than the regions abundantly supplied with the loose superficial fascia and panniculus adiposus. But the immunity of the plantar and palmar surfaces, as will be shown further on, only attaches to the acquired forms.

The movements of the joints (which fortunately are usually painless), in those cases where the lobules encroach upon the flexures of the limb, and continuous flexion of the member during the progress of the development, as is the case with the extremities of the fœtus in utero, must be important factors in determining the boundaries of the masses situated in the immediate vicinity of the joints. In the following case (No. 8) both knees were involved, and but a few superficial furrows were preserved. This child was born in vertex presentation, and the equable tunefaction of the left lower limb would imply that in utero the knee-joint was extended; yet the partial preservation of the furrows at the knee-flexure and on the inner and posterior surfaces of the thigh would indicate that at least a position of semi-flexion was maintained. The pressure, if thus maintained, would seem to have been sufficient to have partially preserved the natural furrows of the integument of the thigh. But in Case 9 (Fig. 14), in which the enlargement involved the entire right lower limb, invading alike both the knee and ankle joints, the surface was marked by several deep "transverse dimples," which did not, however, correspond with the usual anatomical arrangement of the integumentary furrows of the lower limbs of the newly born, as they are marked in cases where the lobular formation of the panniculus adiposus is well developed, or in excess, as in Case 1.

These cases (8 and 9) are also in contrast with the acquired forms, in that the hypertrophy has invaded both the knee and ankle joints. These discrepancies are probably due to different pathological conditions.

Case VIII.[1]—Description from an alcoholic preparation of a child which lived 11 days, and died of icterus. Fig. 13. The child measured in length 46 ctms. Both legs were enlarged. At the inguinal fold the left measured 18 ctms., right 16 (in circumference), at largest part above the knee, the left 20, the right 12; at the ankle, the left 14, right 9. Distance of right heel from crista ilium 25 ctms., to point of great toe 10; length of left foot 9. On the left leg were a few nodes of pea size, and bluish red. The skin was everywhere thickened, covered with woolly hairs and immovable. The sole of foot was thickened and convex. First three toes greatly enlarged, second and third webbed. Skin covering ankle, knee, four smaller toes, and external surface of thigh bluish-red. The swelling was mainly due to the proliferation of the subcutaneous cellular tissue; adipose tissue only being demonstrated by the microscope, except upon the anterior surface of thigh, ball of great toe and sole of foot, where it was greatly augmented. Fat cells not enlarged. Muscles on abdomen pale, on thigh and leg brownish-red. Venous system abnormally developed. Femorals and saphena absent; but two large veins arose one from each side of the great toe, which in their ascent received numerous large branches. All were without valves. Two of the three globular tumors upon the inner side of the knee, the large tumor upon the external and the more diffused one upon the posterior aspect of the thigh were colossal venous cavities, filled with blood coagulated in layers and imbedded in brown connective-tissue layers. The large tumor on dorsum of foot consisted of a perpendicular chain of varices, which communicated with the tumors about the knee.

Fig. 13.

In the right leg the venous system was normally developed; the arteries were alike in both and natural. The enlargement of the right leg was due to excessive development of the adipose tissue, and wherever on the left leg and buttock there was deficient, or, cer-

[1] Specimen presented to Obst. Soc., Berlin, by Dr. Rose, through the favor of Dr. Martin. Monatschrift für Geburtskunde, Bd. 29, 30, 1867, p. 346.

tainly, no excessive development of the venous system, the adipose tissue was in excess.

This specimen presented a co-existence of fibromatous and lipomatous degeneration, yet everywhere either locally excluded the other, the fibromatous existing in immediate association with the venous angiectasis. Hence the inference may be deduced that the excessive development of the connective tissue resulted from an excessive supply and stasis of blood in varicose and valveless veins, and perhaps to that condition was due the difference in the form of the hypertrophy and its invasion of the tissues about the joints. This genetic relationship of venous stasis to connective tissue hyperplasia is more clearly shown in the two next succeeding cases reported by Thomas Smith.[1]

Case IX.—K. R. was born with right lower limb enormously enlarged. The limb maintained the same proportion to the rest of the

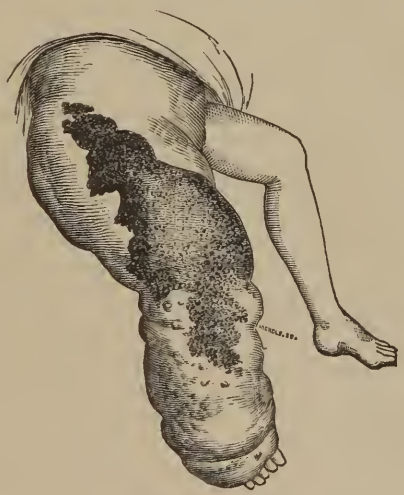


Fig. 14.

body for a time, and then grew in excess. At the age of nine months she was lively, healthy, and robust. The enlargement extended up to the groin, and, following the line of the crista ilium, extended backwards, involving the right buttock. The comparative measurements

[1] St. Bartholomew's Hosp. Rep., Vol. V., p. 147, 1869.

of the circumference of the limbs, as represented in Fig. 14, were as follows:

	Ankle.	*Calf.*	*Thigh.*
Left leg..	4 inches.	$5\frac{1}{2}$ inches.	7 inches.
Right leg.....	15 "	$13\frac{1}{2}$ "	$12\frac{1}{2}$ "

The skin over these parts was thickened, rugose, very dense and hard; here and there studded with fibrous tubercles; and on the leg and foot were a few long and coarse hairs. The foot was masked with thickened integument. The thigh was proportionally smaller than the leg and foot, and was covered with skin softer and extensively stained with a superficial nævus. Over the buttock the skin was soft and natural, but quaggy in places, and discolored with a few scattered nævi. The whole limb was warmer than the left, and three inches longer, the increased length being due to thickened integument on the sole of the foot.

After a month's treatment with continuous compression, the child sickened and died.

Autopsy.—Cutis vera deeply marked by transverse dimples, two crossing the thigh, one two inches deep across calf, and one an inch and a half deep across dorsum of foot. Texture of cutis natural over the buttock, uniformly thickened over thigh, and over leg and foot hypertrophied, condensed, and studded with numerous knots and tubercles. Subcutaneous tissue, from two to three inches thick, about the calf and upper part of thigh, and everywhere occupied by a dense, reticulate, spongy, erectile, venous cavernous tissue, which also invaded the intermuscular connective tissue, and extended on the right side within the pelvis and up into the loins behind the right kidney. The reticular and cavernous spaces varied in size, some large enough to receive the end of the thumb. Muscles healthy; abdominal aorta and branches healthy and of normal calibre. Right internal iliac vein enormously enlarged, and at its exit from the pelvis was joined by others of varying dimensions, some very large. At the back of the limb the abnormal system of veins belonged exclusively to the cavernous tissue, which everywhere pervaded the limb, and was supplied through large trunks formed by tributaries from the leg and foot. The nævi consisted of a spongy, reticulate tissue, containing cavities and interspaces of various size.

Case X.[1]—A girl aged 15, had suffered from birth with an enlarged right thigh and leg, much stained by cavernous nævous growths. The circumference of the right thigh, leg, and foot was from one to two inches more than corresponding parts of the left, and the temperature of the right was distinctly higher than that of the left. Over outer part of thigh was a large cutaneous nævus; on the back of the thigh and inner side were large tortuous veins and nævus growths, and behind the great trochanter were very large venous sinuses, deeply situated.

[1] Smith, St. Bartholomew's Hosp. Rep., Vol. V., p. 150.

Cases 9, 10, and 8 to a less extent, are examples of congenital cavernous angioma,[1] the blood cavities or sinuses being imbedded in layers of connective tissue, and communicating with enlarged, sometimes erratic, and valveless venous trunks. It is also worthy of note that in Cases 9 and 10 the cavernous texture and nævous growths were connected with a system of veins on the posterior aspect of the affected limb which returned its blood through the great sciatic notch. In Case 8 the left lower extremity, in which the venous system was abnormally developed, the enlargement was mainly due to the new formation of the subcutaneous cellular tissue, and in the corresponding member the increased size, though less than in the right limb, consisted of adipose formation, and was unconnected with any abnormality of the venous system. In Case 9 the thickened, indurated, and nodular skin, and immensely increased underlying cellular tissue, were coextensive with "a dense, recticulate, spongy, erectile, venous, cavernous tissue."

In striking contrast with these cases (8, 9 and 10) is the following case of lipomatosis congenita reported by Dr. Rose,[2] and the succeeding one, now for the first time published.

Case XI.—The boy was three years old, delicate, and of well-formed family. Below the right axilla was a tumor, larger than a fist, with unchanged integument and indistinct margins. The brachial artery

[1] It is probable that the following case, recently reported by Dr. Paschal, of Chihuahua, Mexico, is a similar development. At the age of nine a small, hard tumor was discovered on the lower and right side of the scalp, which enlarged rapidly, and when first seen by Dr. P. presented the appearance as shown in the accompanying woodcut. It was sparsely covered with hair. A line drawn transversely across the top of the skull marks the commencement of the bag-like structure, which measured from the line of commencement to most dependent portion fifteen inches, transversely from mastoid process to mastoid process twelve inches, and was three inches thick at lowest part. It was abundantly supplied with blood.—American Medical Bi-Weekly, Vol. VI., p. 1, 1877.

[2] Presented to Obst. Soc., Berlin, through the kindness of Dr. Aschoff, Monatschrift f. Geburtsk., Bd. 29 and 30, 1867.

did not differ from its fellow, and the veins were not dilated. The fourth finger of the right hand was enlarged like a sausage, elongated, and abnormally movable. The last phalanx could be placed without pain upon the metacarpal bone of the thumb, the dorsum of the finger touching the dorsum of the hand. Whilst hyper-extension was thus increased, flexion was absent, for the articular folds were replaced by an adipose cushion of the thickness of a finger. This cushion extended to the end of the finger and made up the elongation. No fat cushion existed upon the dorsum, but it extended along the ulnar up to the elbow, and was directly continuous with the axillary tumor.

Case XII.—Kate Burns, aged 6 years, now (August, 1876) a patient in the Children's Hospital, D.C., was born with right arm

Fig. 15.

larger and longer than left. The left was amputated near the shoulder-joint several years ago, and consequently no comparative measurements can be made. The skin covering right arm, fingers, axilla, extending behind as far as the scapula, and in front over the pectoralis, is thickened; over the arm it is marked by numerous transverse furrows, which divide it into many folds, as represented in Fig. 15. The hypertrophy is confined to the skin and subcutaneous tissue. The folds are movable, and can be lifted from the subjacent tissues. Power, mobility, and temperature normal. No anomalous distribution of circulatory apparatus discoverable. General nutrition good. The growth of the arm does not appear to be in excess. Continuous compression has been tried, without any apparent benefit.

The child is an epileptic, and is now under treatment, with prospect of complete success.

Case XII½.[1]—A child, aged twenty months. At birth a tumor, as large as two fists, extended from the lower third of the occipital bone to the spines of the scapulæ. The tumor had diminished to one-fourth, and there were formed five longitudinal folds of skin hanging from the occiput to a transverse ridge parallel with the spines of the scapulæ. The left forearm was thicker than right, also left hand thicker than right. The two calves were thicker and harder than normal. Anomalies confined to skin and subcutaneous tissue.

Cases 4, 5, 6, 8, 9, and 10 apparently demonstrate the genetic connection of augmented venous supply, stasis, and retardation of current with connective-tissue hyperplasia; but there are instances (see Cases 2, 5, 6, 7, and 8), both congenital and acquired, in which the fibromatous and lipomatous degenerations are found occupying separate territories, or in conjoint development, in which case, in addition to the anomalies of the venous system, the tissues affected were interspersed with numerous caverns and cysts filled with a coagulable fluid, and lined with an endothelium, and, occasionally, communicating with cutaneous vesicles, also lined with an endothelium, and containing a similar fluid. Thus the further inference seems deducible, that the two varieties of degeneration owe their origin to separate and distinct alterations of nutrition, and that in the lipomatous form the lymphatic apparatus is primarily and chiefly concerned. In another class of cases the relation of the connective and adipose tissue developments are such as to indicate the subordination of the latter to the former—that is, with increasing connective-tissue hyperplasia and condensation, the adipose accumulations disappear. Various stages of transition of lipomatous into fibromatous developments are found in distinct cases, and sometimes in the same case, as in Bryk's and Steinwirker's cases. Such cases are characterized, when acquired, by inflammatory processes and transudation of fluid from the cutaneous surface, and, in both congenital and acquired forms, by anomalies of the circulatory apparatus, consisting, almost invariably, in dilated, varicose, and superabundant veins. There is another group, characterized by lipomatous formations and obliteration of all vascular systems, to

[1] Jacobi, Amer. Jour. Obst., Vol. IV., p. 719.

which probably Cases 3 and 11 belong, and a fifth class, in which adipose developments exist in immediate association with lymph stasis. Case 1, which constitutes the basis of this inquiry, presents in association several of these conditions. But before proceeding further with this investigation into the histogenesis of these various phenomena, another marked characteristic, which was present in Cases 8, 9, 11, and 12, demands consideration.

The general growth of the child (No. 1) was satisfactory, and the nutrition of the hypertrophied limb was not only sustained, but in excess of the corresponding member, and in this particular the case followed the general law of one class of cases of congenital hypertrophies, affecting either the whole or any part of a limb. Such congenital excesses of growth may extend through the longitudinal and transverse measurements (or either) of the limb, or part of the limb affected, and may involve the osseous structure. The acquired forms of adipose and connective-tissue hypertrophies, so constantly associated with lymphatic teleangiectasis, are not usually connected with an excess of growth of the bony parts through their longitudinal axes.

It thus becomes necessary, in the further prosecution of the inquiry into the nature of the phenomena presented in my own case, to introduce the cases of partial and colossal growths, which, though characterized by the absence of its predominant features, yet contribute important aid, and cannot be excluded from a comprehensive analysis of its complex conditions.

Prof. Busch divides these congenital hypertrophies into two groups.[1] In the first group the affected parts grow in proportion to the rest of the body; in the second group the giant formation is in excess of the development of the rest of the body. My case, so far as regards the hypertrophy, manifestly belongs to the latter group; for in its progressive development the right lower extremity was in excess of the rest of the body. After death the right lower extremity measured one and one-quarter inches longer than the left.

[1] The classification which I have made is not absolutely accurate, because it is not possible in every case to determine the group from the description. When it is not distinctly stated that the growth of the affected part was in excess, the case has been classed with the first group.

First Group.—The abstract of the cases of Klein, Wagner, Wuff, Ideler, and of Legendre have been taken from the paper, entitled "Contributions to the Knowledge of Congenital Hypertrophies of the Extremities," by Prof. W. Busch.[1]

Case XIII.[2]—The length of the hypertrophic finger of the left hand measured 5½ inches; the third joint was 14 lines, second 1 inch, the first 1 inch thick. Greatest circumference, 4½ inches. The fingers stood in slight ulnar abduction in the articulation of the first and second, and in that of the second and third phalanx, so that it bent over the middle and ring-finger. Motion was good in the metacarpal articulations. The articulation was not normal, as the articular ends of the first phalanx and of the metacarpal bone were much enlarged and malformed.

Case XIV.[3]—Right hand of a boy, which enlarged in proportion to the growth of the entire body. In his fifth year a fatty tumor appeared upon the right breast, which extended from the sternum to the axilla, and was followed by the extension of the hypertrophy from the hand to the forearm and arm. The increase in thickness was caused by irregular pads. The thumb was smaller than natural, and separated from the index finger by a fatty tumor. The index finger measured in circumference 6½ inches; the thinner third phalanx stood in hyper-extension. The middle finger measured around first phalanx 13¼ inches, and decreased suddenly in its third phalanx. Fourth and fifth were hypertrophic and webbed. Between the fifth and wrist-joint was a fatty tumor. Veins upon dorsum of hand varicose. Pulse equal on both sides. Movements of the hand, which weighed 12 pounds, not impeded.

Case XV.[4]—A girl, 16 years old. Second toe of left foot twice as long and thick as it should have been. The first and second phalangeal articulation was supplied with a firm and callous ball. The first phalanx was in slight hyper-extension; movements of flexion and extension difficult.

The plantar surface of first and second phalanx covered with a thick layer of fat. Arteries and nerves "showed nothing peculiar." The ligaments were tense, and formed by shining, firm fibres. Articular ends corresponding to the hyper-extension, "somewhat deformed."

Case XVI.[5]—A man, 32 years old. From birth half of the palm of the three first fingers of the right hand had been deformed by an enormous development of the subcutaneous adipose tissue, which at first grew pari passu with the growth of the body, but in later years

[1] Archiv für Klein. Chir., Langenbeck, Vol. VII., p. 174, 1861.
[2] Von Klein, Von Graefe and Walther's Journal, p. 379.
[3] Wagner, Schmit's Jahr., iii., Supplement, 1842, p. 86.
[4] Bohms, Inaugural Dissertation, Giessen, 1856.
[5] Wuff, Petersb. Med. Zeitschrift, 1861, No. 10, p. 281.

"increased independently." The articular epiphyses of the metacarpo-phalangeal articulations were malformed. The metacarpal and phalangeal bones were enlarged transversely. Thumb hyper-extended. Arteries alike on both sides. The weight of the hand rendered it unfit for function.

Case XVII.[1]—The skeleton of a foot preserved in the Berlin Museum. The bones of the three middle toes exceeded in length those of the pollex and little toe (see Fig. 16), both in the phalanges and in the metatarsus, and were thickened.

Fig. 16.

The great toe was less developed, and the little toe was rudimentary, forming an appendage to the fourth metatarsal. The toes were in strong dorsal extension. The deformities grew in proportion to the rest of the body, and rendered walking difficult.

Case XVIII.[2]—A child, 4 years and six months old. The third and fourth fingers and ulnar half of the volar aspect of the hand hypertrophied, third to the size of an adult. The fingers showed two curvatures—one along the dorsum, the other along the radial side. The last phalanges stood in rectangular hyper-extension. The enlargement was due chiefly to increase of the subcutaneous adipose tissue—a thick elastic cushion, which was on the palmar surface. The little finger was not increased in length, but thickened by a cushion of fat on the palmar surface. Upon the palm of the metacarpus was a very considerable layer of fat, corresponding to the third and fourth fingers, which was divided from the most of the palm by a well-marked line. Motion in the affected parts was limited.

Case XIX.[3]—A boy, aged 12 years. Both feet enlarged. A large lipoma in right gluteal region, and several smaller ones beneath integument of left thigh. Upon both feet (see Fig. 17), as shown upon the left, were large lipomata, both upon the dorsal and plantar surfaces, reaching even beyond the malleoli. The three middle toes were webbed and enlarged.

Case XX.[4]—Healthy girl, aged 16. The fingers (middle) measured $5\frac{1}{2}$ inches in length, and the same in circumference at base.

Case XXI.[5]—A boy, aged 10. At birth the second toe of right foot was elongated and thick, and has steadily enlarged, and now measures seven inches in circumference, and projects three inches beyond the other toes. Skin healthy and natural in color. The metatarsal and phalangeal bones were hypertrophied in the same

[1] Busch, loc. cit.

[2] Legendre, cited by Bohms, loc. cit.

[3] Ideler, Inaug. Dis., Berlin, 1855.

[4] Bigelow, Boston Med. and Surg. Jour., Vol. XLIII., p. 341.

[5] Hamilton, Buffalo Med. Jour., Vol. VI., pp. 154–5.

relative proportion with the soft parts, and the cellular texture had degenerated into a light-colored fibrous mass, holding in its cellules whitish fat granules. The bleeding vessels were numerous, but only two or three required ligation.

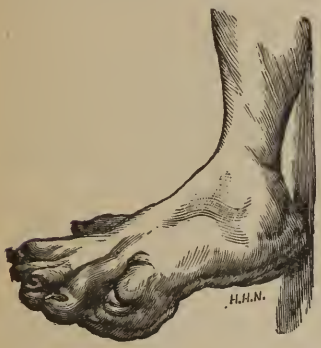


FIG. 17.

FIG. 18.

CASE XXII.[1]—A man, native of India. Right foot measured in circumference 9 in., left $15\frac{3}{4}$; length of right big toe $1\frac{1}{2}$ in., left $4\frac{1}{4}$ in.; circumference of right leg, near ankle, $8\frac{1}{2}$ in., left $7\frac{1}{2}$ in.; circumference of left big toe $7\frac{1}{2}$ in., of second and third toes together 8 in., of fourth and fifth $1\frac{7}{8}$ in.; length of second and third toes (united) $3\frac{1}{2}$ inches. (Fig. 18.)

CASE XXIII.[2]—George P., aged 19. The comparative measurements of the two lower extremities show the excessive development of the right.

	Right.	*Left.*
Entire length of limb	30 inches.	$28\frac{1}{2}$ inches.
Circumference over malleoli	10 "	$9\frac{1}{2}$ "
" of calves	$13\frac{1}{2}$ "	$13\frac{1}{2}$ "
Junction of middle and lower thirds of thigh	$16\frac{1}{2}$ "	$15\frac{1}{2}$ "
Upper third of thigh	20 "	19 "
Of nates	$13\frac{1}{2}$ "	$11\frac{3}{4}$ "

A large superficial nævus occupied the entire limb, extended up to the last dorsal vertebra, and completely covered one-half of the scrotum.

CASE XXIV.[3]—A girl, aged 6. The essential change consisted in large, painless, pad-like tumors upon the dorsum of the hand, and upon the dorsal surface of the middle, ring, and little fingers, all four

[1] Simpson, Month. Jour. of Med., Vol. XX., p. 173.

[2] John Adams, Lon. Lancet, Vol. II., p. 140, 1858.

[3] Kappeler, Chir. Beobacht. aus dem Kantonspital Münsterlingen, 1865, 1870. p. 246.

divided by shallow sulci from each other. They were movable in a lateral direction, and were of the consistence of lipoma; were firmly grown together with the tense, foldless, and thinned integument. The pads began at the metacarpo-phalangeal articulation, and passed without interruption and without pressure over the joint between the first and second phalanx to the articulation between the second and third phalanx, and there descended abruptly to the unchanged third phalanx. Upon the volar side of the first and second phalanx of the fingers there were also similar pads, which did not extend over the articulations, but were divided by the articular folds; upon the volar surface of the hand, opposite the heads of the metacarpal bones, another pad was located, which passed without defined limit into the integument.

Right thumb,		4	ctms.,	Left thumb,		4	ctms.
"	index finger,	4½	"	"	index finger,	5	"
"	middle "	5	"	"	middle "	5¾	"
"	ring "	4½	"	"	ring "	5½	"
"	little "	4	"	"	little "	4½	"

The elongated fingers were enlarged in circumference. The bones of the malformed fingers appeared thicker and bulky. Integument

Fig. 19.

was thinned and tense. The enlargement was due chiefly to lipomatous-like tumors located in the subcutaneous cellular tissue, which only interfered with the functions of the parts to a very slight degree; nothing abnormal could be discovered in the circulatory apparatus, though the affected parts felt colder than the corresponding parts, and were much less sensitive.

Case XXV.[1]—Child, aged 15 months. From birth the left leg

[1] Gun, Chicago Med. Jour., Vol. XXVI., p. 707, 1869.

was enlarged, and from the fourth to the fifteenth month had doubled in size. The development extended from above the knee to the foot, nearly overlapping the toes, and measured in circumference at its largest part (see Fig. 20) 21½ inches. The skin was smooth, attenu-

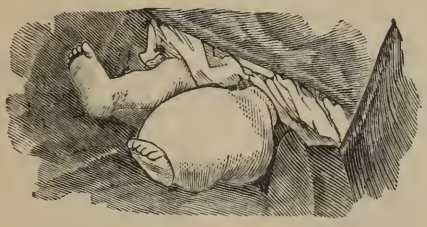


Fig. 20.

ated, and pliable. An exploratory puncture gave exit to serum which continued to flow for one hour. A section of the amputated part exhibited hyperplasia of the superficial fascia, the deep fascia and integument being normal.

Case XXVI.[1]—Victor H., aged 7 years and 6 months. The abnormal and congenital development consisted in enlargement of the annular and auricular fingers of the right hand, of the corresponding hypothenar eminence, of the anterior surface of the forearm, and extended markedly in front of the chest of the same side. The right annular finger was quadruple its normal size, curved backwards, and convex on its palmar surface. Voluntary movements completely abolished. Auricular more like a toe than a finger. Its dimension interfered with the movements of the other fingers; semi-flexion was very limited. The bones participate in the enlargement. Sensibility perfect; no perceptible arterial pulsation in affected fingers.

The palmar surface presented a large prominence, feeling like a lipoma, and the swelling on the forearm felt doughy. Fingers removed and examined. The hypertrophy was confined to the cellular adipose tissue and bone; skin was neither thickened nor attached. The fatty tissue was intersected by trabeculæ, and the areolæ which they circumscribed contained little adipose clusters, which were swollen, and seemed to produce herniæ on the walls of the cellules. Tendons atrophied; vessels rudimentary; arteries filiform; veins difficult to find; nerves atrophied; bones lengthened. Temperament lymphatic.

[1] Michel, Recueil des travaux de la Société Medicale d'Observation de Paris, Tom. I., p. 319, 1857–58. This is probably the same case submitted to the Society by Guersant. In that case the auricular and annular fingers of the right hand were enlarged, and the palmar surface of the hand presented a large swelling. The child was then between 4 and 5 years of age. Gazette des Hopitaux, No. 116, Oct. 3d, 1857, p. 463. Société de Chirurgie, seance, Sept. 23d, 1857.

Case XXVII.[1]—A girl, aged 14. The third and fourth fingers were equably hypertrophic in length, width, and thickness, and to such a degree that the middle finger was one and a-half times the length of the well-formed index. All movements could be executed freely and usefully, and, with the exception of the size, the only abnormity of the fingers was that they assumed a purple color when hanging down.

Case XXVIII.[2]—A young man, aged 20, born with hypertrophy of left foot, which principally attacked the first, second, and third

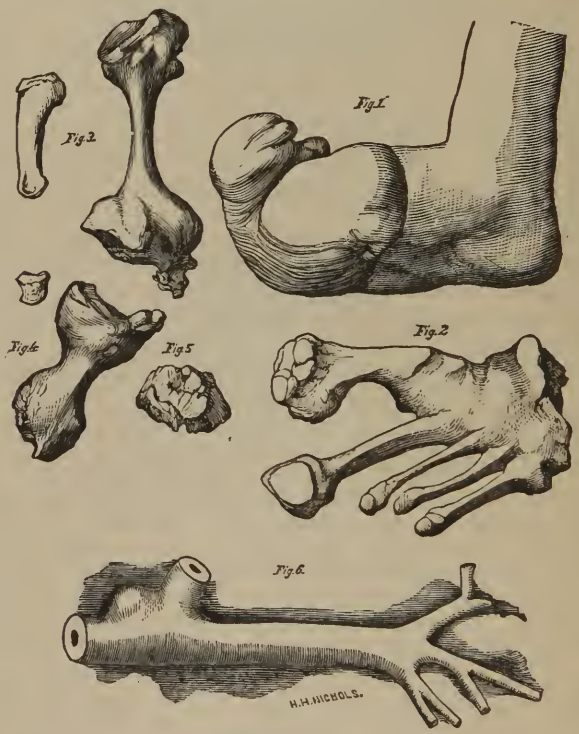


Fig. 21.

toes, of which the two latter were fused into a formless mass. Fourth and fifth normal, but beneath the pad formed by the second and third toes.

The development of the soft parts was due to lipomatous augmentation of the adipose layer, and was principally found in those places

[1] Busch, loc. cit.

[2] Busch, loc. cit.

where the bones were hypertrophic. The fat development was found upon the dorsal and plantar surfaces of the three first toes, extended on the sole to the os calcis, and on the dorsum overtopped the fourth metatarsal bone. It extended over the tibio-tarsal articulation, above which were several smaller lipomata on the anterior tibial surface. All three toes stood in very strong hyper-extension. On the dorsum of the last articulation (see 1, Fig. 21) of the great toe was a deep furrow, which bi-lobed the mass; one, not so deep, was situated over the metatarso-phalangeal articulation of the fused toes, and another was found over the last articulation. The patient could flex and extend the foot; but the motion was limited, and during it crepitus could be heard. Could not move the toes. The tibiæ were of equal thickness, but of unequal length. The amputated foot exhibited fat intimately grown into the integumentary tissue. In some places the lipoma proper lay immediately beneath the thin skin, at others a thick, steatomatous sward lay between the toes, in which the fat was imbedded in very solid, firm, fibrous layers, and underneath this softer lipomatous tissue. Between the dorsal lipomata, and buried into them, lay a network of colossal veins (see 6, Fig. 21), and at the junction of several branches a large ampulla was found. The enlargement of the veins was due to hypertrophy of their walls; arteries and nerves normal; muscles atrophic and pale, and the bun-

Fig. 22.

dles were pressed asunder by fatty tissue. The articular surface of the first metatarsal bone was divided into three facets (2, anterior view; 5, lateral); 3 and 4 show the 1st and 2d phalanx of the second toe, natural size. The diaphyses of the altered bones were narrow, whilst the epiphyses were tuberous, and covered by irregular osseous projections.

Case XXIX.[1]—M. M., aged 3 years, was a healthy and well-formed child, with the exception of a deformity of the fingers of the left hand. At birth the index and middle fingers were much longer than the others. The fingers were quite useless, and possessed very little free movement. The remaining digits were natural. An examination of the amputated fingers showed that the disease consisted of an hypertrophy of all the tissues. (Fig. 22.)

Case XXX.[2]—R. S., aged 16 months. At birth his left hand and arm were larger than the other, and rapidly increased in size. The

Fig. 23.

whole limb, from the shoulder, as shown in Fig. 23, is very much enlarged, chiefly in thickness, although the length also is increased.

The first, second, and third fingers are enormously hypertrophied. The fourth and fifth are of normal size. The metacarpals correspond to their digits, the first three being very large. Both sides of the hand are covered with a thick elastic cushion. The hypertrophy involves all the structures, the great size of all the bones, except of the fourth and fifth fingers, being very evident. The humerus, radius, and ulna are also thicker and rather longer than on the right side, but the enlargement of the arm is chiefly situated in the soft tissues. "The child can use the arm and all the fingers, but he cannot lay hold of anything, and the hand is perfectly useless."

The measurements are as follows:

[1] Annandale, Malformations of Fingers and Toes, p. 5.

[2] MacGillivray, Australian Med. Jour., Vol. XVII., p. 9, 1872.

	Sound.	*Hypertrophied.*
Acromion to olecranon	$5\frac{1}{4}$	$7\frac{1}{4}$
Olecranon to wrist	$4\frac{1}{2}$	5
Circumference of arm	$5\frac{1}{2}$	$9\frac{1}{2}$
Circumference of fore-arm	$5\frac{1}{2}$	8
Wrist to point of index	$3\frac{1}{2}$	6
Circumference of hand	$4\frac{1}{2}$	$9\frac{1}{2}$

The brachial artery was ligated close to the axilla, which arrested the growth, and subsequently the fingers were amputated. The amputated mass weighed $12\frac{1}{2}$ ozs. avoirdupois. The abnormal thickness was mainly subcutaneous fat.

Case XXXI.[1]—Miss ——, aged 16, had from birth an enlargement of both great toes, which projected one inch beyond the other toes. She was constantly troubled with irritation and inflammation of the bursal swellings which formed on the toes.

Annandale briefly refers to a case in which the great and second toes were elongated and enlarged. The phalanges and the part of the metatarsus connected with these two toes were very much enlarged.

Case XXXII.[2]—The deformity presented the appearance of two great toes; but on dissection of the sole of the foot, it was found that

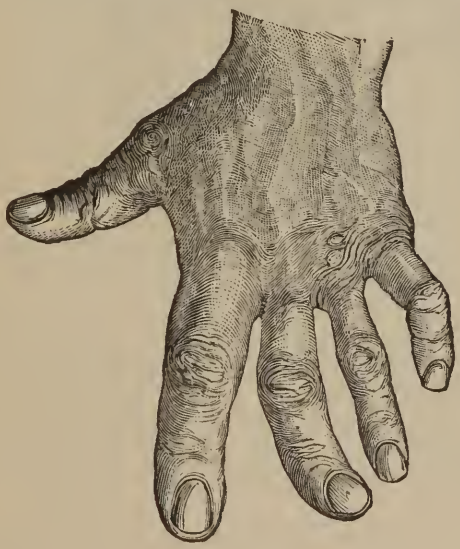


Fig. 24.

the large toe, which looked at first like a great toe, was really a second toe, in which the three phalanges were hypertrophied and anchylosed together. The hypertrophy was congenital.

[1] Annandale, p. 8.

[2] Sydney Jones, Lond. Lan., Vol. II., 1864, p. 549.

Case XXXIII.[1]—W. T., aged 19. Index and middle fingers o left hand exceeding corresponding fingers in length one inch. They are also thicker. Circumference of left carpus one inch greater than right. Muscular tissue slightly more developed on left forearm than right. Motion impaired. Integument, panniculus adiposus, muscles and bones, are in equal proportion enlarged and thickened. Veins of left dorsum more developed than of right. Touch and sensation normal. Growth of hand in proportion to that of body. (Fig. 24.)

Case XXXIV.[2]—Male, aged 20. Left thoracic cavity some-

Fig. 25.

what larger than right; left shoulder somewhat larger than right. Deltoid eminence of left side more prominent. Left arm larger, but not longer. Half of hand belonging to thumb and index fingers abnormally enlarged; left carpus larger than right, left metacarpus enormously wide. Position and condition of hypertrophic fingers shown in Fig. 25. Growth not in excess of the body.

The maximum part of the excessive development of the limb in Case 1 consisted in the hypertrophy of the adipose tissue, and certainly the greater, if not the entire part of the excessive length was due to the fat cushion on the plantar surface. In this case, as is usual in congenital giant developments

[1] Ewald, Virch. Archiv, Vol. LVI., p. 421.
[2] Gruber, Virch. Archiv, Bd. LVI., p. 416.

associated with similar adipose formations, the lipomata are more strikingly exhibited upon the flexion side, differing in this respect from those originating in after-life. They also attack localities which are never selected later in life. There was not in this case any manifest bone-hypertrophy. From the observations cited, it appears that bone-hypertrophy not unfrequently attacks the epiphyses, producing irregular development of the articular ends, which disturbs the normal movements of the joints. In this case the symmetry of the ankle-joint was not disturbed by any bone-malformation, but by the surrounding fat development.

Among the peculiarities which distinguish the congenital giant formations from the acquired forms, Virchow enumerates bone-hypertrophy as an occasional lesion. In the higher grades of these developments, in which the connective tissue is principally involved, bone lesion is quite frequent, and[1] frequently upon section through such diseased parts, from the surface downward to the bone, nothing but a "simple coherent, hard fibrous callosity" is found, which the older authors denominated lardaceous, but which Virchow insists is "nothing but sclerotic connective tissue saturated with clear, expressible serum,[2] rich in round cells," in which the different former tissues cannot easily be distinguished, being partly destroyed or so intimately grown into one another as to form a single mass, producing atrophy of the enclosed tissues, especially of the muscles and nerves, and consequently paralytic and anæsthetic conditions.

If this process should continue down to the bone, the periosteum becomes implicated, and new layers of bone are produced. In some cases a smooth periosteum may be found; in others it is irregular, wart-like, sometimes presenting "thorn-like formations" of most singular appearance.[3] These bone formations

[1] Onkologie, Virchow, Vol. I., pp. 311, 312.

[2] Hendy, Wiedel, and Kaposi insist that it is lymph.

[3] In elephantiasis of the leg, the bones appear thickened, and either smooth, but hardened, sclerosed, or irregular on the surface, studded with pointed and tubercular stalactile exostoses, which project into the hypertrophied soft parts, and may be variously amalgamated together. In the midst of the sclerosed parts carious and necrosed spots are occasionally found. Hebra, Diseases of the Skin, Vol. III., p. 140, Syd. Soc. transl.

may extend into the extra-periosteal layers and even into the connective-tissue callosities. In the structure of these hypertrophied bones Böhms found nothing abnormal; but Busch asserts that the adipose and medullary tissues of the bones are more strikingly developed than the bone lamella—in fact, the latter may be remarkably thinned. Rokitansky[1] divides bone-hypertrophy into internal and external hyperostosis; in the former the increase proceeds from the "Haversian canals and medullary system;" the bone becomes more compact and the medullary cavity is diminished; in the latter form the breadth and thickness of the bone is augmented by the formation of new layers on the periosteal surface, without diminution of the medullary canal. Both forms, he adds, may occur together, and "each is the result of the gradual formation of too great a quantity of the cartilage of bone, in which the normal salts of bone become deposited."

The cases numbered from 13 to 34 (both inclusive), do not uniformly exhibit excess of bone development. Some cases (15, 20, 21, 23, 24, 27, 29, 30, 31, and 33) are characterized by increased thickness and elongation of the bones of the affected part, and fibromatous or lipomatous degeneration of the soft parts; in other cases the hypertrophied (14, 18, 19, 25, and 26) or elongated part (11, 13, and 17) is unaccompanied with any alteration of the bone either in thickness or length, and in such cases the excessive enlargement and elongation is owing entirely to lipomatous formations; in a third class of cases bone-hypertrophy without elongation is found in connection with adipose developments. In several instances, in which bone-elongation was combined with bone-hypertrophy, there were also found alterations of the vascular system; in Case 21 numerous "bleeding vessels (probably veins with thickened walls) were found, and the cellular tissue had degenerated into a fibrous mass holding in its cellules whitish fat granules;" in 23 a large "nævus occupied the entire limb;" in Case 27 the hypertrophied fingers became purple when hanging down; and in Case 14, in which the enlargement was due to lipomatous formations, the veins on the dorsum of the hand were varicose. Case 21 is especially interesting, inasmuch as it shows the probable transition of a pre-existing adipose into a fibromatous

[1] Path. Anat., Vol. III., p. 104, American ed., 1855.

degeneration and bone-hypertrophy and elongation, in connection with a superabundant supply of blood. Hyperostosis and increased length are also found in conjunction with augmented arterial supply. This condition is exhibited in the "three cases (35, 36, and 37) of partial hypertrophy of a portion of the organs of voluntary motion," reported by Dr. John Reid.[1]

Case XXXV.—W. C., aged 15. The right upper extremity was proportionate to the size of the lower extremity and to the trunk, while the left was hypertrophied in the hand, forearm, arm, and region of the scapula. The difference was dependent upon the difference of the relative size of the muscles and bone, from the phalanx upwards to the clavicle and scapula, and in various muscles attached to these. The adipose tissue was not increased, but the cellular and cutaneous textures were probably developed uniformly with the muscular and osseous. The skin of the arm presented a number of red patches, one nearly extending over the scapula; the others were located on the outer side of arm and forearm. The whole arterial system of the left superior extremity was enlarged, and the pulsations of the subclavian, the axillary, and all its branches, down to the digital, beat with great strength. The temperature in right hand was 77°, in left 86°, in the right axilla 98°, and in the left 100°. The comparative measurements were as follows:

	Right.		*Left.*	
Circumference of middle arm	7	inches.	$9\frac{1}{10}$	inches.
" an inch below elbow	$7\frac{5}{10}$	"	$9\frac{8}{10}$	"
Wrist	$5\frac{4}{10}$	"	$6\frac{5}{16}$	"
From inferior angle of scapula to clavicular-scapular articulation	6	"	$6\frac{6}{109}$	"
From inferior angle to middle of spine of scapula	$5\frac{5}{111}$	"	6	"

The movements of extension, pronation, and supination were imperfect and painful.

Case XXXVI.[2]—A girl, aged 2 years, healthy. The middle toe of the left foot projected three-fourths of an inch beyond the great, and equalled in bulk all the remaining toes. The phalangeal and metatarsal bones were hypertrophied, and the foot appeared as if the toe of an adult had been transplanted upon the foot of a child. The foot was of great breadth, caused by the increased thickness of the metatarsal bone and interosseous muscles. The dorsal artery of the foot beats with increased force.

Case XXXVII.[3]—The thumb of the right hand was one-fourth of an inch longer, and was double in thickness of the corresponding finger, and the index exceeded in length the middle one-half inch. The temperature between the thumb and forefinger was 2° to 6° higher

[1] Lond. and Edin. Month. Jour. of Med. Sci., Vol. III., p. 198.
[2] Ibid. [3] Ibid.

than the same locality on left hand. The radial artery of the left was double the size of that of the right arm, and felt more distended with each pulsation.

The three preceding cases (35, 36, 37) were all congenital, and probably belong to the second group, in which the growth of the hypertrophied part is in excess of the rest of the body. They are illustrations of increased nutrition, which affects uniformly all the component tissues of the part involved, which were supplied with a redundancy of arterial blood. There are, however, other cases belonging to the same group which do not present the same anatomical relation of the different textures of the parts affected. In the report of the following case of M. Chassaignac,[1] no allusion is made to any alteration of the arterial system, though the surface of the hypertrophied extremities presents a number of venous blotches and varices, which the reporter designates under the name of "*taches érectiles cuticulaires diffuses.*"

Case XXXVIII.—C. L., aged 18. Had scrofulous glandular abscess on the right side of the neck. The two members of left side were those of an individual of ordinary stature, while those of the opposite side seemed to belong to a giant. The different parts of the two last members were not uniformly hypertrophied. The hand was much more so than the arm and forearm; its external half more than the internal; the thumb, index, and middle fingers were relatively much longer and much more voluminous than the two last fingers. The leg and thigh were less voluminous than the foot—this was colossal. The great toe was enormous, but relatively less developed than the four last toes. The man affirmed that he had at least three times as much strength in the enlarged members as in those of the right side.

Case XXXIX.[2]—B. D., born with left lower extremity more developed than the other. The skin presented diffused redness with circumscribed bluish spots. The right foot was also enlarged. The growth of the left extremity increased with astonishing rapidity. The child nursed, slept, walked, played, and at the age of three years, when, suddenly crying out, with her hands on her head, she died in a few moments.

Case XL.[3]—In a six-year-old Polish Jewess existed general hy-

[1] La Lancette Française, Gaz. des Hopitaux civils et militairis, May 8th, 1858, p. 215. Chirurgical Society, Meeting Apl. 28th, 1858.

[2] Gherini (de Milan), Bull. de la Société Imperiale de Chirurgie de Paris. 2d Series, Vol. VIII., 1868, p. 350, Meeting Oct. 16th, 1867.

[3] Burow, Deutsche Klinik, 1864, No. 24, cited by Busch, loc. cit.

pertrophic development of the second and third toes, and of the respective metatarsal bones. The bones as well as the soft parts were hypertrophic and grew rapidly.

Case XLI.[1]—A young man, aged 19, native of Beaugency, was affected with a general and congenital hypertrophy of the left leg.

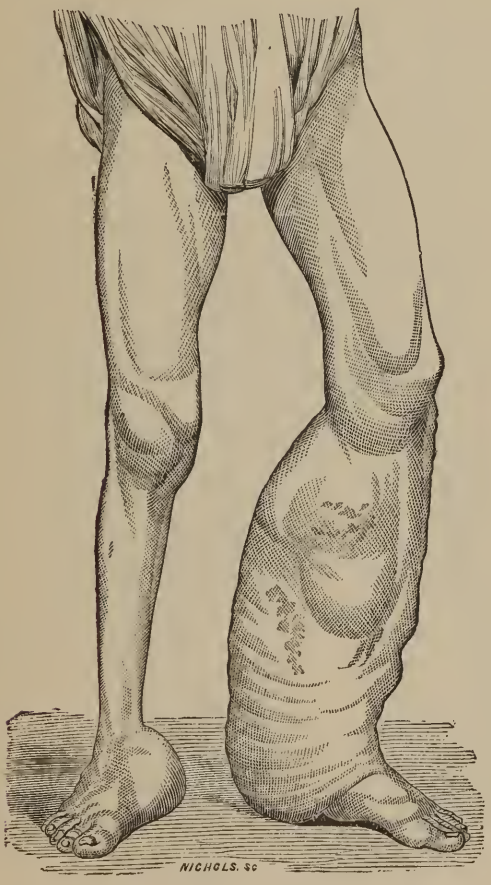


Fig. 26.

The tumefaction was irregular, formed (see Fig. 26), moreover, at the expense of the soft parts, and appearing as an indolent mass attached to the member, which seemed to be formed of flabby tissue, giving to the hand the sensation of little lobules separated by fibrous partitions,

[1] Poulain, Revue Photographique des Hopitaux de Paris, 1872, p. 283.

and limited to the subcutaneous cellular tissue, the skin being completely independent of it. The bony portion seemed also involved; the anterior surface of the tibia was one-third larger than the surface of the opposite one, and the bone was lengthened. Above the external malleolus were little varices, and on the plantar surface of the corresponding heel a large tumor. On the body were a number of true lipomata, and the mammæ were enlarged by an increase of fatty tissue. Extension of the tibio-tarsal articulation was limited.

Case XLII.[1]—A girl, aged 12 years, with hypertrophy of the fused second and third toes of the right foot. The fused toes were in hyper-extension in all their articulations, and protruded one inch beyond the other toes.

Examination of the amputated toes showed thickness of the adipose tissue between the skin and bone; on the plantar and dorsal surfaces, arteries, veins, tendons and nerves, normal. Osseous parts, especially the epiphyses, enlarged in all their dimensions.

Case XLIII.[2]—A healthy and intelligent girl, born with the index and middle fingers of left hand hypertrophied to three times their normal size. The enlarged middle finger measured eight inches in length, and the same in circumference. The index measured four and a half inches, both in length and circumference. The two fingers were bent in opposite directions (see Fig. 27). On the dorsum of the

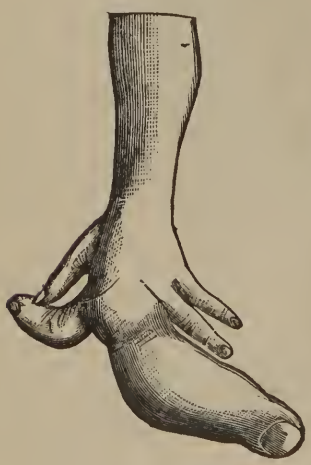


Fig. 27.

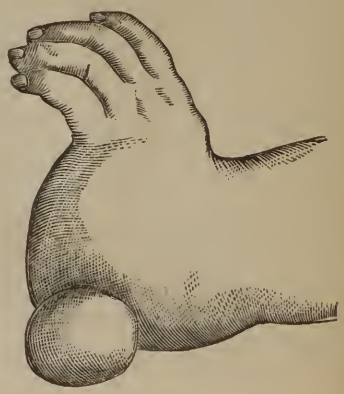


Fig. 28.

metacarpus was a tumor, apparently fat, and on the carpus another. The skin covering the hypertrophied fingers was deep pinkish; temperature and sensibility were normal; motion was imperfect.

[1] Busch, loc. cit.

[2] Adams, Month. Jour. of Med., Vol. XX., p. 170.

Examination of the amputated mass exhibited hypertrophy of the metacarpal bones, and very great elongation of the three phalanges of the middle finger. The epiphyses were not ossified, the bones were firm, and on longitudinal section exhibited everywhere a vast predominence of adipose structure, which with the hypertrophied and elongated bones, constituted the bulk of the deformed mass.

Case XLIV.[1]—A. T., aged 7 years, was born with an enlarged and distorted right thumb. At one year of age it began to grow and

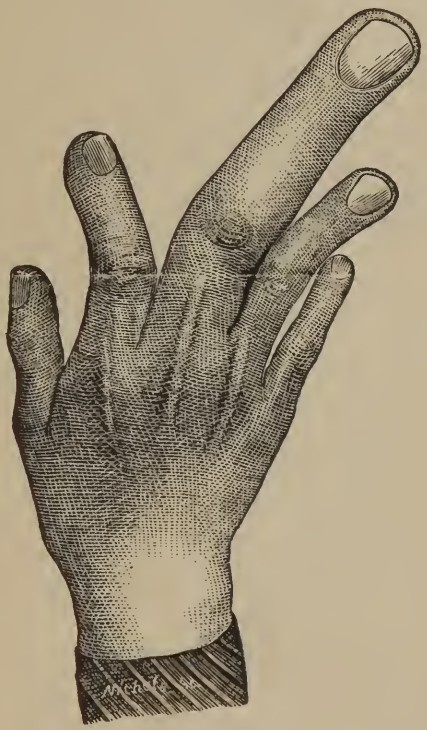


Fig. 29.

increased very rapidly, and the swelling extended to the forearm. The areolar tissue was increased, and the muscles of the arm and forearm were hypertrophied. The humerous, radius, and ulnar feel enlarged. (Fig. 28.)

Case XLV.[2]—E. H., aged 15. Hypertrophy and elongation of the fore, middle, and ring finger of right hand (see Fig. 29,) and of

[1] Annandale, loc. cit., p. 6. This author furnishes several additional illustrations, but the cases are not reported.

[2] Curling, Medico-Chirurg. Trans., Vol. XXVIII., p. 337.

the thumb, index and (see Fig. 30) middle fingers of the left. The right middle finger five and a half inches in length, and in circumference four; the left index and middle fingers measured five inches in circumference. All the parts of the hypertrophied fingers were equally developed in excess, the bones, articulations, integuments, and nails. The motions were not destroyed, but greatly impeded. The

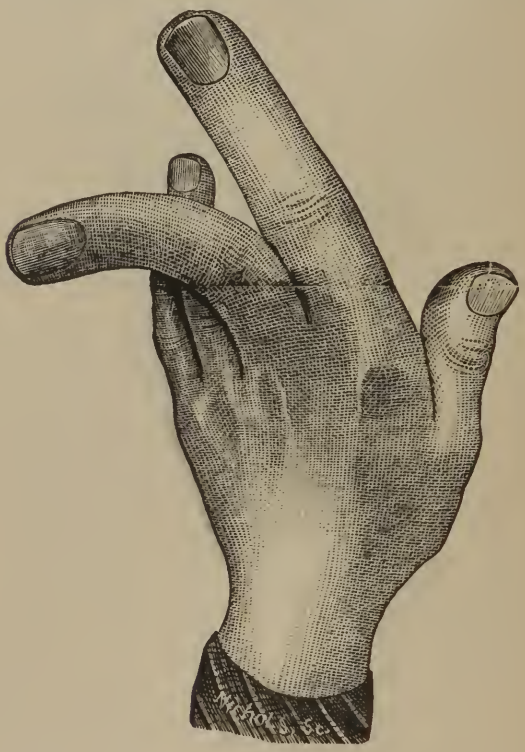


Fig. 30.

fingers were cold, but sensation was not impaired. Pulsation could be detected in the digital arteries, but it was indistinct.

Case XLVI.[1]—A girl, 2 years old. The middle finger of each hand was twice as long, and more than twice as thick as the index fingers.

Case XLVII.[2]—A Spaniard, aged 50 years. At birth the first and second fingers of right hand were enormously hypertrophied. He could write and use the hand as if there was nothing unusual about it.

[1] Owen, cited by Curling, loc. cit.

[2] Paget, cited by Curling.

Curling refers to two other cases. The cast of one is to be found in the Museum of King's College, and represents a hypertrophic middle finger; of the other, a cast, showing the hypertrophied second and third toes of a child, had been shown him by Dr. Little.

The foregoing classification of the cases of giant formation is somewhat arbitrary, necessarily rendered so by the incompleteness of the reports, which in many instances contain no allusion to the progressive development of the hypertrophied part. Busch suggests that in the cases in which the hypertrophied part increased in a higher degree than the rest of the body, there was always found "simultaneous lipomatous degeneration of the adipose tissue;" and in those cases in which the "soft parts enlarged pari passu with the giant formation of the skeleton, the growth of the part advanced only in proportion to the rest of the body." Neither can be accepted as established laws governing these developments, though in a majority of the cases of each group the enlargement is due principally to excessive fat formations.

The object here is not so much to study the relation which the fatty, fibrous, and osseous developments bear to the comparative development of the affected part to the rest of the body, but to ascertain, if possible, the connection which the arterial, venous, and lymphatic circulation may have with these several forms of hypertrophy. It has been previously suggested that venous stasis stood in direct genetic connection with connective-tissue hyperplasia, and lymph stasis with excessive adipose formations; but only in a few anatomical examinations have the arteries been found normal, and in none have they been found enlarged. In a few living subjects excessive development of the arteries was recognized. Cases 35, 36, 37, and probably 38, 42, and 45, are instances of increased nutrition, due, manifestly, in Cases 35, 36, and 37 to augmented arterial supply; but in Case 42 the arteries and veins were not enlarged, and in Case 45 the pulsations of the digital arteries were so indistinct as to lead to the conclusion that they were inadequate to the ordinary supply of arterial blood. Cases 42 and 45 are curious instances of an hypertrophy affecting equally the skin, nails, muscles, and bones, and yet unaccompanied with any of the circumstances which favor excessive growth.

The patient in Case 44, says Curling, exhibited "a feeble constitution, nutriment was sparing, there was no extraordinary exercise of the part, no enlarged vessels, or activity of circulation," and a diminution of the temperature. In Case 38 power was increased, and in No. 1 and a number of others it remained unimpaired. When power is preserved, the muscles are normal, or at most anæmic; when increased, as in 38, the muscles are hypertrophied—this latter condition being found, presumably, in connection with a superabundant supply of arterial blood and an elevation of temperature. When abolished, or greatly impaired, with or without bone hypertrophy, but not occasioned by bone deformity, the adipose or fibrous degeneration predominates, and atrophy of the muscles, arteries, and nerves has, to a greater or less extent, ensued. The veins seem to offer greater resistance to the atrophic process than the other soft parts. Thus while normal or augmented nutrition, that is, nutrition affecting equally all the parts, follows the general law—one depending upon an adequate, and the other receiving an increased supply of nutritive blood, quantitative or qualitative alterations of nutrition, affecting exclusively the soft parts, or confined to either the adipose or connective tissue, or invading unequally the soft and bony structure, exhibit no uniform condition of the circulatory system. The condition of the arteries shown in Cases 35, 36, 37, 42, and (inferential) in 38, is in marked contrast with the condition found in Cases 39, 41, and 43, in all of which there was bone elongation, but only in the latter instances bone thickness. This fact is, however, insufficient to dissociate augmented arterial supply from bone thickness, for the conditions of bone elongation and thickness are found in simultaneous existence with increased arterial supply.

These observations exhibit great diversity of phenomena and a want of uniformity of anatomical conditions. Enough, however, is shown to establish two facts: 1st. Elongation of a limb, or of a part, may be due either to increased length of the bones, or to the formation of fat cushions on the plantar surface of the foot, or at the ends of the fingers or toes, or both conditions may be concerned in producing the increased length. 2d. Bone thickness is most frequently found in connection with connective-tissue hyperplasia, and even when not invading the dia-

physis, the epiphysis were nearly always thickened. Lipomatous formations may co-exist upon the flexor and extensor sides, but most usually they attack the flexor aspect, and frequently select localities never invaded by the acquired forms. In my case (No. 1) the elongation of the limb was due to the fat formation on the plantar surface—an additional reason why it should be classed with the cases which develop in excess of the rest of the body.

Excepting the few cases of increased nutrition, in which the soft and bony structures were equally enlarged, no constant modification of the arterial system is shown. Occasionally the arteries are found normal in connection with either lipomatous or fibromatous degeneration; but usually they are very much atrophied, sometimes absent, and never enlarged. Nevertheless, the connection between the supply of arterial blood and analogous alterations of the tissues is established by the results in those cases, of which No. 4 is an example, in which ligation of the main arterial trunk supplying the effected part is followed by arrest, and sometimes by cure of the growth. Venous blood and lymph must, to a certain extent, be regarded as the derivatives of arterial blood, and only so far as it is the source supplying these fluids can it hold any causative connection with the alterations of nutrition which affect unequally the constituent tissues of the hypertrophied part. The transuded serum of venous blood is poorer in nutritive material than lymph, and connective tissue is a lower grade of organization than the adipose. From the fluid plasma all the tissues originate, and lymph is the plasmatic fluid minus the nutriment abstracted by the tissues it has traversed, and plus certain waste-products of nutrition. Œdematous fluid "consists" (Wagner) "in a pathological accumulation of quantitatively and qualitatively changed lymph in the lymphatic radicles" and spaces within the tissues, and "œdematous parts chiefly or wholly consisting of connective tissues" show a separation of the fibres by a fluid "sometimes very poor, sometimes very rich in lymph corpuscles;" its only "essential and constant elements, but in very variable quantity, are lymph corpuscles."[1] Such accumu-

[1] Mr. Johnathan Hutchison, in a clinical lecture on certain forms of solid œdema of the legs (Lond. Lan., Aug. 26, 1876), enumerates seven classes of cases. In the first group he includes all cases of passive dropsy occurring in

lations of lymph may result from interruption of the current of the lymph through the lymph-channels proper, or from the transudation of the blood serum through the venous radicles, in consequence of some impediment to the return current of the blood; in the latter event it would contain the salts, fat, and urea in the same proportion as present in the blood, but the albumen, fibrinogenous substance, and corpuscular elements in much less quantity. In the former case the accumulated fluid would represent the lymph proper, a fluid far richer in the elements of nutrition, though varying, according to the exigencies of nutrition, in the proportion of fat and corpuscles. The fat and connective tissues are in structure the same, the former being distinguished from the latter by the presence of fat in the cells, which, under certain conditions, may again (Virchow) disappear, and the adipose will be reduced to simple connective tissue. Several cases, previously cited, exhibit various stages of transition of the adipose into connective tissue hypertrophy, and, as a rule, these transitional conditions were only exhibited in cases in which some abnormal condition of the venous system was present. This fact becomes important, and supplies additional evidence in confirmation of the view that the impoverished lymph transudation is the genesis of the connective-tissue hyperplasia, though it does not exclude the

connection with mere debility; in the second, all œdemas due to positive impediment in the heart, and in the third group, all œdemas from renal disease. In these forms the œdema is always symmetrical. In the fourth group he includes all cases due to mechanical obstruction to the return venous current, such as pregnancy, abdominal tumors, and compression of the iliac veins. To the fifth group belong all cases where actual disease of the venous trunks is present, in which class it is custommary to include phlegmasia dolens, but which Mr. H. thinks is more likely caused by lymphatic than venous obstruction. The sixth group comprises those cases in which the œdema is wholly or chiefly due to lymphatic obstruction. Mr. H. believes that the lymphatic system takes a large and the chief share in the production of œdema, and that the vessels are frequently occluded by inflammatory thickening. In such cases the œdema is non-symmetrical, not always connected with enlarged or devastated glands, and is not easily distinguished from chronic inflammation of the cellular tissue. The direct communication of the lymph vessels with the areolar interspaces affords ample facility for œdematous accumulations. In the last group he includes all cases caused by erysipelatous and elephantoid inflammations, and by thrombosis of the venous capillaries. He cites several cases caused by syphilitic inflammation of the lymphatic vessels.—Med. News and Library, Vol. XXXV., p. 1, 1877.

probability that occasionally, and especially, in protracted cases of lymph stasis, caused by impediment to the onward flow of the lymph, similar development may not take place, for the lymph proper may be or become impoverished—too poor in fat, but abundantly rich in the elements essential to the growth of connective tissue.

In this connection I may also cite the cases of Quincke and Weichselbaum.[1] The first was a case of chylous ascites, the extravasation of the chyle into the walls of the intestines and peritoneal cavity having been caused by the closure of the chyle vessels by inflammatory thickening of both folds of the mesentery, and transformation of the interposed adipose tissue into "tense connective tissue." The chyle vessels were engorged with chyle exactly to the union of the intestines with the mesentery, not injected in the latter; the mesenteric glands were small and without chyle retension. In Weichselbaum's case there was no extravasation, but stasis of chyle in the chyle vessels of the mesentery and hypertrophy of the interposed adipose tissue of the mesentery. The hypertrophy had assumed the tumorous form, and was thickly interspersed with cavernous spaces, communicating with the chyle capillaries and filled with chyle. The structural changes found in the mesentery, in the cases respectively, were present in connection with opposite conditions of the chyle vessels. The transformation of the adipose tissue into "tense connective tissue" took place in Quincke's case, in which the chyle capillaries were occluded so that none of the fluid could permeate the vessels which traversed the mesentery. In Weichselbaum's case the extraordinary development of the adipose tissue of the mesentery was found in connection with stasis of chyle and its retention in the dilated vessels and cavernous spaces of the mesentery. It cannot be asserted that the retention of chyle in the mesenteric vessels, in Weichselbaum's case, was the cause of the excessive adipose formation, nor that its absence from the vessels, in Quincke's case, was the cause of the transformation of the adipose into connective tissue, but the singular juxtaposition of the morbid phenomena justify such a conclusion, and is corroborative of the teaching of cases herein reproduced.

New-formed fatty tissue consists in the increased size or

[1] New Orleans Med. and Surg. Jour., March and May, 1877, Cases 43 and 50.

multiplication of the fat cells, or in the transformation of connective-tissue corpuscles, and may be diffused or circumscribed. When circumscribed, it not unfrequently assumes the tumerous forms, with regular or lobed surfaces, and divided by partitions of connective tissue into variously shaped masses. These tumors are most frequently located in the subcutaneous tissue, and may be either firm or soft, according as the connective tissue or fatty elements predominate,[1] or when the vessels are developed in excess may assume the form known as the lipoma teleangiectodes. Lipomatous formations, says Busch, when existing, submit to no limitation of growth, but may increase in proportion to or advance more rapidly than the rest of the body.

Fatty atrophy may take place under various conditions—the retrograde change occurring either through serous atrophy of the fat cells, or by multiple division of the nucleus, and formation of young cells which become migratory or connective-tissue cells.

Fatty metamorphosis may affect normal tissues or pathological formations, and is invariably the result of disturbance of the circulation and nutrition. The function of the part invaded is either impaired or wholly abolished.

Fatty and connective tissue new-formations are interchangeable conditions—that is, either may succeed to the other. The lipomatous transformation is, however, most frequently found in the areolar form of fibromata, which usually attacks the skin and subcutaneous cellular tissue, and consists of fibrous bundles and spaces filled with a serous fluid. It usually affects the connective-tissue corpuscles, but rarely the basis substance. The stellate connective corpuscles of Virchow are the lymph lacunæ of Recklinghausen, and, if not identical with, contain the branched cells of Klein, which constitute a system of anastomosing and communicating tubes and canals—the canalicular system of the body, through which the lymph flows. Klein (New Orleans Med. and Surg. Jour., Vol. IV., p. 327) derives the fat cells of the serous membranes from transformed branched cells, and holds that the nourishment normally provided for the production of lymphoid cells is consumed in the formation of fat cells.

[1] Wagner, Manual of General Pathology.

These considerations lead me to the conclusion that the lipomatous and fibromatous formations and degenerations, exhibited in the foregoing cases of giant growth, are the pathological results of a stagnation of lymph—"the non efflux of the nutritive fluid." This stasis may be occasioned by conditions which affect the lymph channels, or which primarily involve the circulatory apparatus, causing excessive transudation of the blood serum, or both systems may be concerned either proximately or remotely. Under conditions which favor either or both forms of new-formation, the process may progress so far as to produce atrophy of all other soft tissues, and, under further conditions favorable to such transformation, either may subordinate the other. These conditions cannot be definitely defined, but many circumstances induce me to believe that the transuded blood serum—a fluid comparatively poor in the corpuscular and fat elements—is principally concerned in the genesis of the fibromatous forms, and lymphangiectasis in the lipomatous forms. In support of this view, the following cases may be cited:

Case XLVIII.[1]—Augusta B., aged 10 years. The right leg was nearly as large as the rest of the body, and appeared like the leg of a well-nourished, strong man. The foot was colossal for even such a leg, and the toes were enormously enlarged. The bones of the foot were everywhere enlarged. The color of the leg was a fresh flesh, the foot had a purplish hue. Temperature of leg normal, foot cool. The skin appeared shining; was neither dry nor flaccid, not traversed by ectatic veins nor œdematous, possessing normal resistance, and showed no indications of disease. On the dorsum of the foot a large venous cord coursed longitudinally. The comparative measurements of the legs, as shown in Fig. 31, were as follows:

	Right.	*Left.*
Circumference of middle of thigh.....	16 inches.	9½ inches.
" above patella.....	14¼ "	7 "
" across patella.....	14 "	8½ "
" around lig. patellæ.....	13½ "	7 "
" middle of calf.....	15¼ "	8 "
" above malleoli.....	10 "	6 "
" of foot, posterior third....	18¼ "	6¾ "
" points of little and great toes	18¼ "	5¾ "
" great toe.....	6¼ "	2¾ "
Length from trochanter to edge of heel.....	28½ "	21 "
" " edge of heel to point of great toe	11½ "	6½ "

[1] Friedberg, Virch. Archiv, Vol. XL., p. 353.

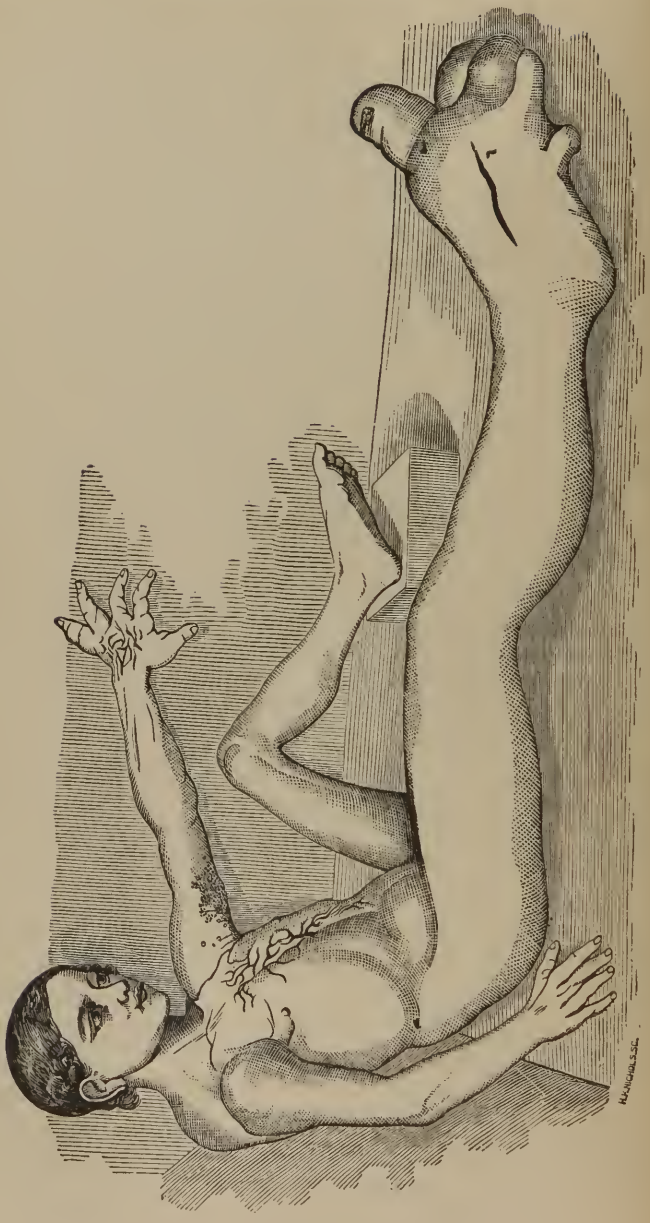


FIG. 31.

A large lipoma, sharply defined, semisolid and elastic, covered with normal integuments, occupied the space between the upper halves of the scapulæ; a second one was located between the sixth and ninth dorsal vertebræ, flatter and softer than the other, but measuring more in circumference; a third was situated over the crest of right ilium, measuring six inches antero-posteriorly. The posterior wall of left thorax was stained with a diffuse superficial nævus, and in the centre of the sternum lay a network of varicose cutaneous veins, which extended downwards to the umbilicus; a similar one occupied the anterior external side of the left humerus. The lymph glands upon left side of neck and along inferior maxilla were hard, movable tumors, united in strings, and sometimes crowded in groups. Between the left nipple and shoulder were two uneven, small, flat, movable tumors, and in the axilla and upon the inner side of the left arm was a network of hard, nodulated, movable, thin cords, over which the skin was occupied by light yellow colored vesicles, from hemp-seed to bean size. Upon the inner and posterior side of left forearm were S-formed, bead-like rows of small, flat, semisolid nodules, from hemp-seed to bean size, which were lost in the region of the plica cubiti, and extended to the volar side of the wrist-joint; several were movable over the subjacent tissue, but fixed to the skin; they were not fixed and extended into the deeper tissues. Upper third of left forearm measured in circumference 8 inches, right 7. Left wrist $5\frac{1}{4}$, right $5\frac{1}{2}$. The skin over the thickened portion was of a dirty grayish-blue or brownish color. The panniculus of left hand underneath the normally colored skin, traversed by dilated veins, was everywhere hypertrophic and of a semi-fluid softness, with a flatty rugged surface. The left hand was much larger than the right, and not proportionately formed.

These abnormal conditions were observed at birth. The child was otherwise healthy, nursed, grew fast, and walked at eleven months of age. Excepting an attack of sickness during dentition, the child continued well until four years old, when it was seized with a chill, followed by fever, pain and redness of the left thorax and left arm, accompanied with swelling, vesicular formations, lasting about eight days, terminating in resolution, with desquamation of the skin of the affected part. These attacks, which sometimes resembled lymphangitis, and at other times erysipelas, recurred at varying intervals during the succeeding years, sometimes limited to the thorax or arms, and at other times extending over both. During one of these attacks the nævus upon the dorsum of left hand developed, and several times large blood vesicles were formed, which ruptured. After each attack the part affected remained enlarged and continued to increase in size. The right arm and hand also became involved in these inflammations, and finally both arms and hands grew to the enormous proportions represented in Fig. 32. During the earlier years of these recurring inflammatory attacks, the enlarged right leg was free from them, but subsequently it became subject to periodic inflammations; nevertheless it continued to grow in all its dimensions

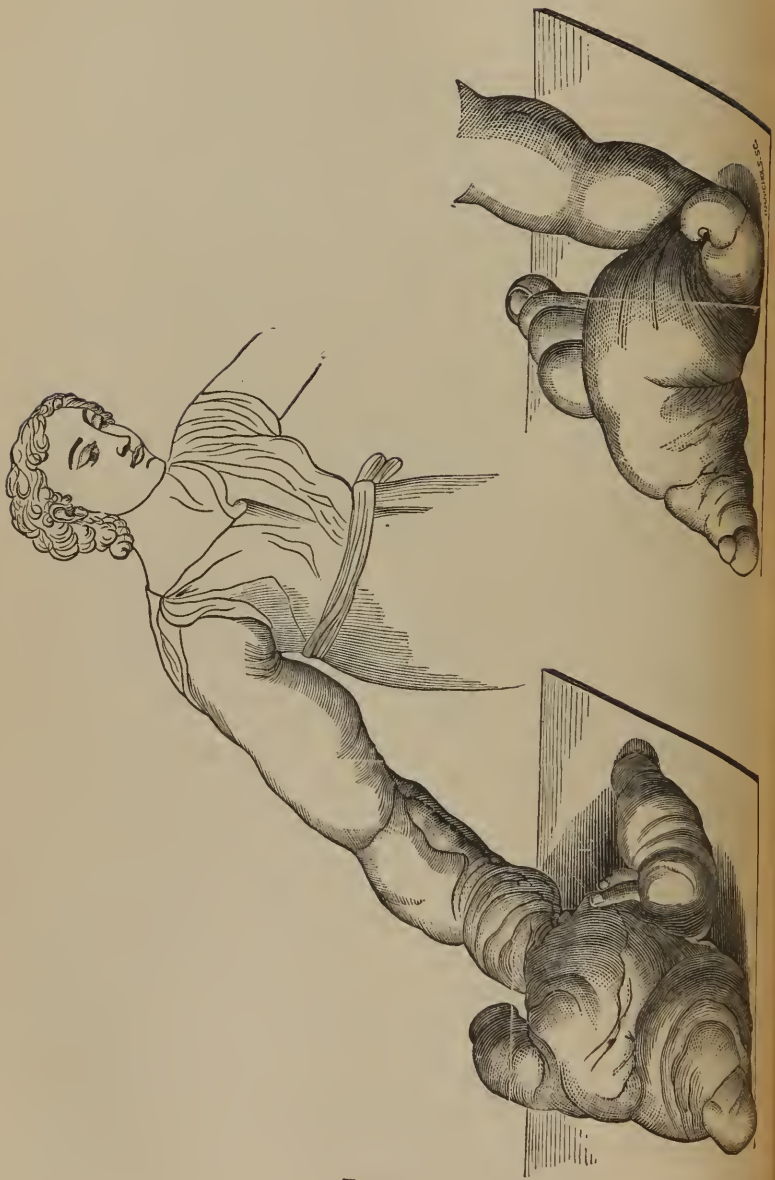


FIG. 32.

from birth to her death, which took place in her tenth year, of phthisis pulmonalis. No autopsy.

Case XLIX.[1]—J. C. D., aged 7 years; healthy. When two and a half years old, the enlargement of the leg, which did not extend above the knee, and was most apparent above the ankle and on the inner and front aspect of the tibia, was first observed. The skin was normal, only tightly expanded over the tissues beneath, which was always increased by standing or walking. The limb gradually enlarged, and the tumefaction extended upwards, involving the entire thigh, until it measured as follows:

Upper third of thigh	16 inches.
Middle of thigh	15½ "
Knee-joint	13 "
Below knee	12 "
Calf	11 "
Lower third of leg	11 "
Above ankle-joint	7¾ "
Instep	9 "
Base of toes	6½ "

When the system was out of order, the leg always enlarged. During the period of growth, herpetic spots appeared at various times on the leg, foot, and scrotum, and, when the leg had reached its largest development, a small pearly-looking vesicle appeared on the upper part of the penis, which finally ruptured and discharged from time to time a milky-looking fluid, which exhibited the following characteristics: Faint sickening odor, salt-like taste, alkaline reaction. There was no uniformity in rapidity of coagulation. The clot bore the closest resemblance to that of blood, except being softer and destitute of red corpuscles. It contained a large quantity of fatty matter and fibrin, a molecular baselike chyle, and numerous pale cells resembling white blood corpuscles.

A patch of yellowish-white vesicles, seeming to contain a cheesy matter, appeared on the upper part of the leg, and, subsequent to the rupture of the vesicle on the penis, a cluster of similar vesicles appeared on the dorsum of the foot. The discharge was always followed by reduction in the size of the limb, and was sometimes so copious as to produce great debility, confining him to bed. Occasionally, after the disease had continued for several years, he was subject to attacks of inflammation limited to parts of the affected limb, which was attended with high fever, loss of appetite, burning pain, and redness of the part. Finally, in consequence of the recurring discharges, his general health became seriously impaired, characterized by great weakness and prostration. Sometimes the discharge in the beginning was pure lymph, changing, after it had continued for a while, into a chylous fluid, exhibiting the characters before described.

[1] Day, Trans. Clin. Soc., Lond., Vol. II., p. 104, 1869.

Case L.[1]—M. X., aged 17. Health always good. On the 9th of March, 1852, while playing, he noticed that a liquid, at first colorless, but soon acquiring a milky tinge, was flowing from a definitely located spot on the inner and lower part of the left thigh, where were found, after careful examination, very small elevations in considerable number, and depressible. Some days after, M. Demarquay observed the liquid at first almost colorless, with a slightly muddy tint,

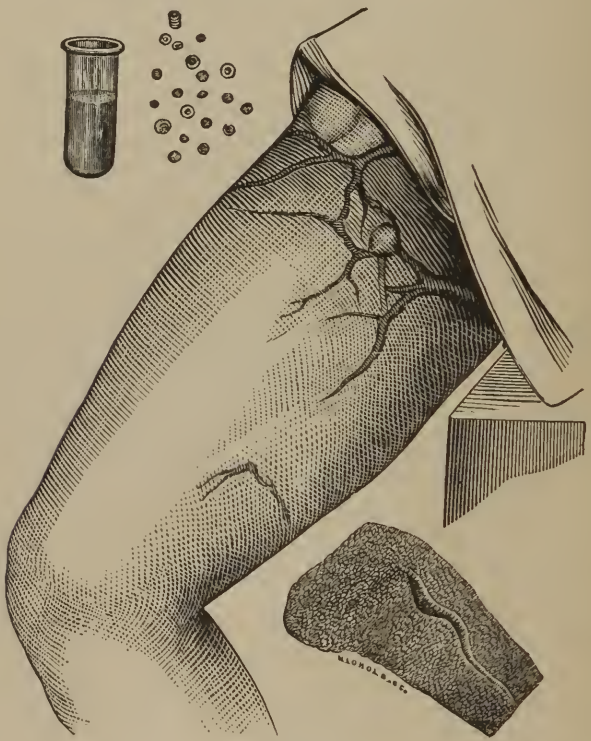


Fig. 33.

and passing to a yellowish-white, jetting with considerable force from little granulations situated upon and around an elevation, three or four centimetres in extent, depressible, and like a varix, extending in a slight curved line from the anterior to the inner part of the thigh, as shown in Fig. 33. This elevation became more evident upon walking, and diminished with rest. Several discharges took place during the following six months, and on November 1st one occurred which

[1] Demarquay, Mém. de la Soc. de Chir. de Paris, Tom. III., p. 139.

lasted nine hours. A portion of this was collected in a vessel, and soon coagulated like blood. In the centre of the mass, a clot formed which appeared composed of a series of reddish filaments swimming in the midst of an abundant serum. M. Lebert declared the fluid to be lymph. Subsequent to this the varix increased in volume, and the little granulations, before described, became transparent vesicles, which, when pricked, discharged copiously a similar fluid. Another series of vesicles appeared on the anterior surface of the same thigh, and in the groin there was a small venous varix. The affected thigh increased in size in excess of the sound limb. In this case there was dilatation of a lymphatic vessel, and also of the superficial network, in two well-defined points of the thigh. The boy continued to lose large quantities of lymph without any impairment of his general health. Compression above and below the point from which the lymph flowed gave rise to a jet of appreciable duration; pressure below did not arrest the flow.

Case LI.[1]—A female infant, weighing seven pounds. Right leg twice the size of the left, surface slightly purplish, with here and there a bluish tinge. The whole limb, from Poupart's ligament in front, and around by the crest of the ilium behind, down to the toes, was one mass of twisted and contorted varices. The vermicular prominences rolled round and round the leg in a singular manner, as represented in Fig. 34.

Fig. 34.

Motion was perfect, though obviously painful. The transpiration from the limb was so abundant and exhaustive that the child grew weak from day to day. On the fifth day large blebs appeared on

[1] Paterson, Edinburgh Med. Jour., vol. xvi., p. 1012.

each side of the ankle, and the color and general appearance changed; it became darker; the copious transudation continued, the exhaustion increased, and death took place on the ninth day after birth.

Examination of the limb proved the varicose prominences to be enlarged lymphatics, filled to distention with a milky, serous fluid. From their abrupt beginning in front, around the buttock and down the limb the lymphatics were twisted, corded, and rolled together. Around the crest of the ilium and along the course of Poupart's ligament the tissues were condensed, resembling tight bands stretched. There was no appearance of glandular or other structures. The muscles, glands, blood-vessels, etc., beneath were natural and no distended lymphatics could be discovered in the deep tissues. The tissues from the iliac crest to the pubis seemed like a mass of hardened cellular tissue. No anastomotic connection between the superficial and deep-seated lymphatics could be discovered.

Case LII.[1]—F. N., aged 19 years. When one year old the right thigh was larger than the left, more or less so according to the use of the limb. When four years of age, after a short walk, without unusual exertion, the right thigh was observed to be double the size of the left. The swelling extended from the groin to the knee, was not sensitive or painful, and was covered with normal colored skin. It remained, now larger, now smaller, but occasioned no inconvenience. After a while the skin upon the anterior and inner aspect and towards the scrotum thinned in several places, forming small shining spots slightly elevated, which ruptured spontaneously and discharged a yellowish-white, opalescent, somewhat tenacious fluid, which, upon exposure to the air, coagulated into a jelly-like mass. When the rupture occurred while walking, the fluid would jet out for several feet, and sometimes a pint or more was lost, which would be followed by a sense of great exhaustion, paleness, and languor. These discharges recurred three or five times during a year, and continued for thirteen years, during which time the swelling extended to the leg and foot, and similar thinned spots formed upon the plantar surface and between the toes, but none appeared upon the leg. When ten years old, without discoverable cause, violent pains around the right trochanter, extending across the right gluteal region and down the thigh and leg, supervened. At the same time, the extremity from the groin to the sole of the foot began to enlarge more rapidly, the thigh attained the circumference of the body of an adult, and the foot and leg increased in proportion. Subsequently, a large abscess formed in the gluteal region, which after a time ruptured and discharged during several months large quantities of pus, and after it healed the thinned spots developed into transparent vesicles, the size of peas, containing a clear liquid, the integument thickened and felt firmer, the epidermis roughened, the furrows deepened, and the papillæ enlarged. The limb enlarged throughout its whole length, and numerous vesicles formed upon the anterior and inner surface of the thigh, and upwards towards the groin and scrotum, reaching one and a half lines

[1] Thilesen, Zeitschrift f. klinische Medicin, Bd. 7, p. 447, 1856.

in height, transparent and filled with a watery fluid. The contained fluid could be pressed back, but immediately returned upon the removal of the pressure. One of the larger cysts was opened and the evacuated fluid proved, on microscopic examination, to be lymph. Finally, pleuritis set in, and the patient died.

Autopsy.—Skin hypertrophic throughout all its layers; more so upon the anterior and inner part of the femur. Throughout the hypertrophied portion was a large meshy net of dilated lymph-vessels, some of which had attained the size of goose-quills. The most superficial vessels could be traced into the cysts projecting from the skin, and they were ampulla-like dilatations of the extreme ends of these vessels, with thinning of their walls. Upon the lymphatic trunks situated outside of this extremity nothing abnormal could be discovered. The lumbar muscles were atrophic. The connective tissue of the lowest portion of the leg was infiltrated with pus, the articular cartilage of the lower end of the tibia was destroyed, the ends of the bones carious; the ligaments destroyed, tarsal bones carious. Tubercular deposits in both lungs beginning to soften; small caverns in left lung. Tubercular deposits in liver, spleen, and other abdominal organs.

Case LIII.[1]—A laborer, aged 22. Right thigh began to swell a year previous to admission to hospital, first at the upper part and then gradually downwards to the toes. Skin not changed in color; no pain in the part. Small openings appeared about the middle of inner side, from which a milky fluid exuded every three or four weeks, and his leg and foot began to grow and became very firm. Before admission the thigh was enlarged throughout its whole extent and, since, the scrotum and penis became involved in the swelling. Left leg quite natural; appearance strumous; dissipated. The right leg is one-third larger than the left, of natural color and temperature; imparts to the touch a feeling like a female mamma distended with milk. There was a sensation of hard irregular cords lying in a brawny structure. No œdema. Towards back of thigh, and scattered over the lower half of its extent, were numerous vesicles, varying in size from a pin's head to that of a pea. No redness surrounded them. From them the milky fluid was discharged, and when tapped it exuded drop by drop. The fluid separated on standing into a rounded coagulum, smooth and shining, and a watery looking fluid. It contained bodies resembling lymph-corpuscles, granules and fatty molecules, albumen, fibrin, but no sugar.

The cases 48, 49, 50, 51, 52 and 53 present very many points for discussion, some of which will be deferred until other cases presenting similar conditions have been introduced. The case of Friedberg (48) is, perhaps, the most remarkable instance of collossal giant-growth on record. Chassaignac's case (38) of

[1] Hilton, London Lancet, 1866, Vol. II., p. 37. Acquired. Introduced for comparison.

congenital hypertrophy of the extremities of the right side, with multiple sanguineous blotches and varices, and another case of enlargement of the arm, referred to by Friedberg, are somewhat analogous. A description of the latter case was found by Meckel von Hemsbach in the posthumous papers of his uncle, and represents the length of the right arm to be such as to reach down to the middle of the leg. All the tissues, including the bones, were hypertrophied, and the increase was most striking towards the lower end of the extremity. The patient of Chassaignac affirmed that he had three times as much force in the members of the right side as in those of the left; in Friedberg's case the power in the affected limb, though not commensurate with the enormous development, was increased; in Paterson's, in which the abnormality was limited to the superficial lymphatic vessels of the right lower limb, there was no increase of the muscular tissue, though motion was perfect, but painful, and never voluntary. In Smith's case of nævoid elephantiasis (9) the muscles of the diseased limb were healthy and of normal size, the blood-vessels were enlarged and temperature increased. The patient could move the limb, but could not raise it. In Reid's case (35) the excessive growth of the member was due to the relative increase of the muscles and bones. The adipose was not appreciably increased, but the cellular and cutaneous tissues were developed uniformly with the muscular and osseous. The arterial system of the hypertrophied limb was enlarged, and the temperature was augmented. The patient could move the arm, but pronation and supination were imperfect. In the cases of excessive adipose formation, mobility and power were uniformly impaired, and in those cases where the observation was made the temperature of the part was below the normal. In such cases sensibility was diminished in consequence of atrophy of the nerves of the part.

The constant co-existence of nævi, both in the giant formations and lymphatic developments, is a somewhat singular phenomenon. Chassaignac's case was complicated with multiple sanguineous blotches and varices on the affected limb. In Adams' case a superficial nævus was located on the affected limb. In Gherini's case, the skin was red, with circumscribed bluish spots. In Friedberg's case an ectatic venous cord coursed along the centre of the dorsum of foot, and nævi formed upon the

hypertrophied hand during the progress of the disease. The skin of the hypertrophied arm in Reid's case of increased nutrition of the left thoracic extremity presented a number of red patches, some very large. In Smith's case the surface was extensively stained with a dusky red subcutaneous nævus. In Demarquay's case a small nævus developed in the groin during the course of the affection, and in my own case (No. 1) several nævi were present, and the vein, as shown in Fig. 3, coursing between the cluster of vesicles and the anterior margin of the limb, is enlarged, and presents a tortuous outline due to increased length. In the two cases (Friedberg and Demarquay) in which nævi were developed during the progress of the disease inflammatory processes preceded the nævoid developments, and it is not improbable that the congenital nævi may have been formed during inflammatory processes taking place during intra-uterine life. In the congenital cases, in which the proliferation of tissue has resulted from stasis of lymph, there are no manifest or objective inflammatory phenomena, but a condition remains which finds its cause in changes already effected, which produce stagnation or a supply in excess of the capacity of the effluent vessels. Smith suggests that there are three forms of congenital hypertrophies, differing as the altered nutrition may depend upon an augmented supply of blood or lymph, or, as he erroneously supposed, of chyle.

By comparison of the several parts of the enlarged and elongated extremities in these cases, it is found that the abnormal increase of the length increases towards the distal end of the extremity. In Friedberg's case the leg increased in length faster than the thigh, the foot faster than the leg, and the toes faster than the foot. This phenomenon was also exhibited in several of the cases of partial growth, confined to a portion of an extremity, most notably in the case (45) reported by Curling. The character of the growth in the cases of Friedberg, Chassaignac, and Meckel, differed. In Friedberg's the leg was everywhere full and rounded, whereas in Chassaignac's the hand was larger in proportion than other parts of the arm, and in Meckel's case the arm was irregularly formed.

The development of the right leg and of the upper extremities in Friedberg's case exhibits very different phenomena. The leg seems to have been an instance of true hypertrophy,

and the probability is that all the tissues were uniformly hypertrophied. Power, though not commensurate with the increased volume of the limb, was preserved, and motion, necessarily awkward and incomplete, was never painful. The arms were irregularly enlarged, and the hand grew in excess of the other portions. These irregularities in the growth of the upper extremities were due to circumscribed and irregular formations of the connective and adipose tissues. The disease manifestly began during fœtal life. Friedberg suggests that the conditions may have originated from some affection of the vaso-motor nerves; or from impediment to the circulation in the lymph-vessel, produced by a swollen lymph-gland or other tumor; or from a morbid composition of the blood, and consequent infiltration and proliferation of tissues; or from inflammation of the skin and subcutaneous connective tissue, lymph-glands, and vessels. The dilatation of the cutaneous veins upon the inner side of the left arm, the hemorrhagic vesicles, the grouping of the evidences of disturbed circulation around the left clavicular and sternal regions, the enlargement of the chain of lymph-glands along the left inferior maxilla, and on the left side of the neck, the formation of a network of hard, nodulated, movable thin cords, over which the skin was occupied by light yellow vesicles, and the other evidences pointing to morbid conditions of some part of the lymphatic system, suggest probable obstruction to the flow of blood in the left innominate vein, which extended its influence over the adjacent portions of the lymphatic and venous systems. The case presents the co-existence of venous teleangiectasis of the skin, dilatation of superficial veins, ectasia of lymph-vessels, lipoma, and diffuse proliferation of the adipose and connective tissues.

In Day's case there can be no doubt that the disease had its origin in some derangement of the lymphatic circulation, and Dr. Day was correct in ascribing the overgrowth to the retention in the affected parts of lymph, which he regarded as a nutritive fluid.[1] In this opinion Paget[2] and Broadbent, who examined the case when presented to the Clinical Society, and Drs. Sanderson[3] and Callender, to whom it was referred

[1] London Lancet, Vol. I., 1849, p. 462. [2] Ibid., Debates before the Clinical Society.

[3] Trans. Clin. Soc., Lond., Vol. II., p. 113.

for a more careful examination, concurred. The growth of the limb was due to the infiltration of the fibrinous fluid into the subcutaneous cellular tissue. As the child could resist more strongly with the right than with the left leg, it is probable the muscles were increased in size. The committee were satisfied that the bones were also enlarged.

So far as the observations can be relied on, the cases of Day, Demarquay, and of Mr. Hilton, in which similar phenomena were present, though in the latter the condition was acquired, the direct relation of lymph stasis to these developments is established, for in each case the chemical and microscopic examination and physical properties of the fluid leave no doubt as to its nature. But the case of Thilesen is even more conclusive.

The continued presence and increased growth of the tumor in the latter case, often varying in size, and unaccompanied with change of color, pain, or sensitiveness, exclude any possibility of the presence of either acute or chronic hyperæmia, and the absence of any lesion referable to the blood vascular system excludes any connection of the enlargement with venous stasis. On the contrary, the presence of meshes of dilated lymph-vessels, their direct communication with the cutaneous vesicles, the development of the cicatricial spots into vesicular formations, and the rapidity of the growth in those parts most abundantly supplied with capillary lymph-vessels, and, furthermore, the first appearance of the swelling in the region very rich in networks of lymph-capillaries, show conclusively that the alteration of the nutrition of the parts was due to some defect in the lymph-circulation. The swelling followed the course of the large superficial lymphatic branches, ascending from the foot and leg and running along the vena saphena, and of the lymph-vessels proper of the thigh, emanating from the rich network upon the inner and posterior aspect, and penetrating the entire tissue of the integument down to the fascia, and also those sending branches upward towards the superficial inguinal glands, and encircling the inner and external half of the thigh. Unlike Friedberg's case, cases 49, 52, and 53 were unaccompanied with any inflammatory process, œdematous infiltration, or phlebectasis, but in Paterson's case (51), which differed in so far that the varicose lymph-vessels were on the surface of the extremity, and could not be traced

in anastomotic connection with the deep-seated vessels, there was a profuse transudation of a watery fluid. There was no lesion of the blood-vessels. The fluid was lymph, but poor in nutritive elements, and the only change observed in the tissues was hardening and condensation of the cellular tissue in circumscribed localities.

In Thilesen's case the changed growth was without inflammatory concomitants, and manifestly due to the retention and altered elaboration of lymph. A serous infiltration may be caused by hydræmia, mechanical impediment to the circulation of the blood, especially in the veins, or from defective absorption. In either case a change in the nutrition of the parts may ensue. The formation of the vesicles, the development of the cicatricial spots into vesicles, the lymphorrhagia, the chemical and microscopical characters of the discharged fluid, and the post-mortem appearances leave no doubt in regard to the lymphangiectasis, but other conditions were present during the progress of the case, which Thilesen insists are sufficient to determine the presence of a lymphatic varix. Phlebectasis is excluded by the absence of pain, of dilatation of the superficial veins and changed color along the varicose veins, and of a single hard cord along the course of the affected vein; by the non-appearance of œdema in the neighborhood of the ankle and on the dorsum of the foot during the earlier stage of the disease and its gradual extension upwards. The infiltration in phlebectasis results from increased transudation in consequence of increased blood-pressure in the venous radicles and their dilatation, or from interrupted venous circulation. The accumulated fluid is consequently watery, poor in solid constituents, and the resulting swelling would present all the characteristics of ordinary œdema. Absorption may be normal, or perhaps increased, and with rest of the affected limb the intumescence would probably disappear entirely, or diminish. In consequence of the poverty of the fluid the changes in nutrition are very slow, and the enlargement partakes more of the nature of an anasarca than an hypertrophy; and finally, phlebectasis is usually connected with some constitutional affection or distant local disease, and attacks the most distal parts, where the circulation is least supported by the muscles. Lymphangiectasis is usually found in circumscribed localities, where the net-

works of lymph-capillaries are most numerously distributed. The swelling is more diffused, not in the form of single hard cords, is more resistant, and the surface is unchanged. It usually extends downwards, and is not so much influenced by continued rest and the posture of the affected limb. In lymphangiectasis there is also an accumulation of fluid, resulting from diminished absorption or interrupted lymph circulation. The fluid consists of the normal pre-existing parenchymatous fluids, the nutritive juices continually conveyed thither, and partly of the fluids consumed by the functions of the parts and saturated with organic débris. It is, however, more abundantly supplied with organic elements, as well of the progressive as retrogressive metamorphosis, with albumen and fibrinous substances, than the accumulated fluid in phlebectasis and ordinary œdema. The tumor, therefore, says Thilesen, "offers characteristics from the beginning different. Formed of a more consistent, coagulable, and partly organizable material, it possesses greater consistence, is nearly compact to the touch, which will increase as the fluid undergoes peculiar changes during its retention in the parts." The development is peculiar, not altogether unlike phlegmasia and scleroma, and similar to Virchow's lymphatic hydrops, which more frequently than the ordinary œdematous fluid, if, indeed, this ever does, becomes inspissated and is assimilated, leading to hypertrophy. Thilesen attributed the pus formation to over-distention and accumulation of organizable material without corresponding power of assimilation, whereby a large part of the mass remained in a lower degree of development—in the form of pus-cells. The pus collections necessarily partook of the nature of cold abscesses, and were located in the connective tissue. This, he also maintains, constitutes another distinctive feature of the case, for pus formations in phlebectasis usually begin in the coagula formed within the varicose vein, is associated with acute symptoms, and may result in purulent absorption.

This group of interesting cases may be properly followed by another group exhibiting lymph varices under very different conditions.

Case LIV.[1]—A child, aged three years, had phymosis and adhe-

[1] Hamilton, Buffalo Med. Jour., Vol. VI., p. 11, 1850-51.

sion of the prepuce to the glans penis, also along the raphé of the scrotum, extending from an inch in front of the anus to the glans penis, an elevated sinus with transparent walls of about the size of a crow's quill, closed at both ends, and nearly filled with a whitish cream-like fluid, which could be seen to pass from one point to another when pressure was made.

Case LV.[1]—A man, aged 29. Entered hospital for urethritis following suspicious coitus. Had always carried, on the posterior portion of the raphé of the scrotum, two little enlargements, of soft consistency, variable size, globular, of transparent white, less colored than the neighboring skin. They attained the size of a pea, opened spontaneously, and from them oozed an opaline, whitish, milky liquid. From the fistulous openings a variable quantity of lymph was discharged, which could always be increased by pressure from behind. Later new vesicles formed at the root of the penis and underwent the same evolution. The prominences and fistulæ were ranged along an antero-posterior line; a projecting cord, irregular, knotted, brownish, extending from the anus to the base of the scrotum, at which point it presented two larger fistulous vesicles. Further on the cord was less perceptible, but to the touch its irregular and unequal form was appreciable. At the level of the prepuce there was an increase of volume. The fluid was lymph.

Case LVI.[2]—A man, æt. 28. Had upon the inner surface of the right thigh, close to the side of the scrotum, about two dozen clear, small vesicles, very similar to herpes vesicles, a little larger than pin heads, in part confluent, scattered over a space not larger than a hand, which he had first observed in his tenth year. Between the vesicles, which were in close proximity to each other, a connecting duct could be distinctly demonstrated, which upon pressure projected with moderate tension, whilst at the same time the vesicles diminished. The discharge, which recurred several times during a year, and continued sometimes three days, presented under the microscope all the characters of lymph. It was increased by pressure made upon the inguinal region, but only appeared guttatim.

Case LVII.[3]—A boy, æt. 18. While quietly sitting in school, felt a liquid trickling down his leg from the genitals, which continued five hours. It was a milk-white fluid, and ceased spontaneously. After six months the discharge recurred, and afterwards was repeated every three or four weeks. Müller, of Würzburg, whom he consulted, observed upon the scrotum a multitude of pale yellow vesicles, more upon the right than upon the left. From one of the largest which he punctured a milk-like fluid was ejected in a jet, which upon chemical examination proved to be lymph. Subse-

[1] Zambaco, L'Echo Medical, Tom. III., p. 66, cited by Binet.

[2] Communicated to Gjorgjewic by Prof. Gault. Archiv f. klin. Chir., Langenbeck, Bd. 30. p. 674.

[3] Wiedel, Inaug. Abhandlung, 1837. Müller, Hufland's Jour., Feb., 1822, p. 81.

quently, in the presence of Brüninghausen, Textor, and Schönlein, one of the vesicles was nipped with scissors, while the patient was in a horizontal position, whereupon a yellowish, odorless, tasteless, lymph-like fluid was discharged, which, after continuing to flow for one hour, changed into a milk-like fluid. In the yellow fluid, after standing a day, a yellow cake floated, which appeared like a membrane arranged in layers, and resembled jelly; beneath it was a cake of darker color. In the milk-like fluid a cake also formed, and beneath it an albumen-like membrane of the thickness of a knife. The discharged fluid was pronounced lymph. This condition continued until he reached the age of fifteen, then the scrotum became suddenly inflamed, red, very painful, and enlarged to three times its size. The inflammation extended to the perineum and adjacent skin; a large tumor formed between the scrotum and anus, which subsequently ruptured and continued to discharge a considerable quantity of watery fluid. In consequence of these continual losses his strength gave way and he died of phthisis pulmonalis.[1]

Case LVIII.[2]—A boy, aged 10, a Brazilian, had upon the prepuce an opening, from which, after the removal of a small occluding scab, was discharged a fluid slightly colored red from the presence of red blood-corpuscles, and which after standing became milk-white. The scrotum, without being very much enlarged or otherwise degenerated, had upon its surface numerous white vesicles, from which, when punctured, poured a milk-white fluid, sometimes in very great quantities. The fluid discharged through the preputial fistula came from a varicose lymph-vessel, and as was shown by compression proceeded from the root of the penis. The fistula was supposed to be connected by dilated vessels and degenerated glands with chyle-containing trunks, because of the character of the fluid, which was lymph mixed with chyle. It was slightly alkaline, and after standing deposited white coagula, here and there dotted with red spots, soft, and not compact, having the form of a bag containing a white fluid. In the fluid lymph-corpuscles were sparse, but there were numbers of granules, which ran together, forming fat drops. It had a faint, but not disagreeable odor. Cream formed upon its surface. It contained albumen, watery and alcoholic extracts, fat, and cholesterine. The quantity of fat varied with the amount of fatty-food ingested.

The varices in cases 54, 55, 56, 57, and 58, so far as could be determined by exploration, were limited to the superficial lymph-vessels, which feel under the finger, when of the cylindrical form, like "hard, knotted, flexible" cords; when ampullar like rounded tumors, unattached to the skin, are depress-

[1] It is possible that cases 56 and 57 may belong to the acquired forms. This is, however, doubtful, and hence their introduction here.

[2] Hensen, Archiv f. die Gesamnt. Physiolog. des Menschen und der Thiere, Bd. X., p. 94, 1875.

ible and resume their form when the pressure is removed. It is not possible to recognize varices of the deeper system of lymph-vessels, but such a condition may be inferred when, without (Phillipe Aime-David) any appreciable cause, the enlargement of a limb is associated with a varicose condition either of the plexuses or subcutaneous vessels insufficient to account for the tumefaction of the limb. To the consideration of the forms and causes of these varices I will again recur, when other cases have been reproduced.

Case LIX.[1]—In his paper on Makroglossia, Virchow refers to the very singular case he observed in a new-born calf, where, in consequence of thrombosis of the external jugular vein, the mouth of the thoracic duct was occluded, and nearly all the internal organs were dilated to the utmost by ectatic lymph-vessels filled with a slightly sanguinolent fluid. The intestines especially were covered everywhere with broad bead-like canals, arranged so closely together that the intervening tissue could be scarcely recognized.

Case LX.[2]—A specimen obtained by M. Amussat from the body of a youth aged 19 years. During life the boy carried in each groin a large tumor, which was supposed to be double inguinal hernia, and for which he had worn a truss. Suddenly, in the morning, having the previous day made a long journey on foot, he was seized with acute pains under the right breast, and in the folds of the groins, difficult respiration, dry cough, cephalalgia, fever, and lancinating pains in the tumors. This condition became aggravated, and after some hours of intense suffering the patient died.

Autopsy, twenty hours after death.—Numerous spots on different parts of the body; putrid decomposition; the skin generally ecchymosed; that of the lower extremities of a deep violet color. A thin membrane covered the tumors. After removing the membrane, a knotted sac, irregular like the spermatic vesicles, was discovered. The sac contained purulent matter.

The abdominal cavity contained a large quantity of sanguinolent serum, but no pus; no trace of peritonitis; on the left side the cyst containing the pus extended in the crural sheath to the inferior third of the thigh; on the right side the purulent collection did not pass so low, but pressed under the crural ring.

[1] Virch., Archiv, Vol. VII., p. 130. This case is an illustration of the effect upon the lymph-vessels connected with the main trunk, of any interruption to escape of the chyle from the thoracic duct. This, together with other cases which belong to the acquired forms, will be discussed in the paper appearing in the *N. O. Med. and Surg. Jour.*

[2] Cited by Breschet, Le Systeme Lymphatique, Paris, 1836, p. 260.

The right pleural cavity contained pus and red serum; the left side but a small quantity; right lung engorged with black blood and froth, adherent at its upper part.

After having turned out the thoracic viscera diseased lymphatic vessels were discovered. Some were as large as quills. The entrance of the thoracic duct into the subclavian vein was recognized. The mass of dilated and twisted vessels extending to the iliac fossæ was dissected out, and is represented in Fig. 35.

The iliac and crural masses of lymphatics were insufflated and unravelled, and it was discovered that the hernial tumors were enormously dilated lymphatic vessels. The iliac ganglia of glands had disappeared, and seemed to have been replaced by lymphatic vessels. No direct communication with the veins was noticed.

The heart, arteries, and veins, the liver, pancreas, kidneys, and bladder were normal. The vesiculæ seminales[1] were large and flabby; vessels very much injected; persistent arborization; a small quantity of serum in the ventricles of the brain.

Fig. 35.

The following case, somewhat analogous to the last, has been reported by the late Prof. Drinkard,[2] of this city. The hernial

[1] Several writers have referred to Amussat's cases, and one to his case of dilatation of the lymphatic vessels of the spermatic cord. I have failed to find such a case, and suppose the error has grown out of this reference to the condition of the vesiculæ seminales.

[2] Amer. Jour. Med. Sci., Vol. LVI., p. 436.

tumor was discovered in the cadaver of a very black negro on the dissecting-table; consequently it cannot be determined whether the condition was congenital or acquired.

Case LXI.—The tumor occupied nearly all the superior part of the groin, being situated rather more to its outer than its inner side; its upper boundary slightly overlapping Poupart's ligament; ovoid in shape; about four inches in its long diameter, by three and a half in its vertical diameter; baggy in appearance, the skin loose and sacculated towards the inner and inferior portion. To the touch, the tumor, at first mistaken for a femoral hernia, was soft, doughy, inelastic, its contents yielding to pressure, but slowly returning when it was removed. It appeared in some parts more compact and consistent than in the rest.

On dissection a thickened superficial fascia was exposed. From the meshes of both of its layers protruded the cellulo-adipose tissue of the region. The tumor presented no connection with either the crural or inguinal ring, and appeared like a mass of cellulo-adipose tissue, interspersed with lymphatic glands evidently undergoing fatty degeneration, and presenting here and there, over its dissected surface and through its substance, patches of a pale rose color, resembling cellular tissue infiltrated with blood serum, and bearing in some points a closer resemblance to fresh muscular tissue.

Dr. Drinkard refers to another case which presented decided similarities to his, which he saw in the service of M. Nélaton (Hôpital des Cliniques), in 1863, and which the latter denominated glandular hypertrophic tumors, which are to be distinguished from those formed of "varicose lymphatics and exude on incision a limpid lymph." In regard to this case Nélaton remarked as follows:

"The first idea given by the tumor is that it is formed by the testicle, which has become deviated in front of the abdominal aponeurosis, and an omental hernia has followed the testicle, which would give to the tumor the peculiar sensation experienced on palpation."

This, however, he excluded, for the reason that no pedicle traversed the inguinal canal.

In Drinkard's case the course of the lymphatics of the limb, leading to the tumor, was marked by bluish-black lines, which gave the limb a marbled aspect.

M. Trélat[1] refers to another case, of a young man upon whom M. Nélaton operated by excising a lymphatic tumor. He says:

[1] Gaz. des Hôpitaux, July 5, 1864, and Amer. Jour. Med. Sci., Vol. XLIX., p. 247.

"The diagnosis being uncertain, an incision was made over the mass, when a considerable quantity of thickish milk-like fluid escaped, leaving only irregular flaps, and some beaded filaments, which were removed. The patient, a robust man, was seized with rigors and symptoms of purulent absorption, and died. The tumor on the opposite side, which had not been operated on, was injected by M. Sappey, and was shown to consist of a network of varicose lymphatic vessels."

The succeeding case, reported by M. Trélat,[1] though not certainly congenital, exhibits conditions more strikingly resembling those found in Amussat's (60) case, than either Drinkard's or Nélaton's. The tumors in this case were mistaken by Trélat, Nélaton, and by the physicians of l'ile Maurice for hernial sacs, and their true nature was not suspected during the lifetime of the patient.

Case LXII.—A youth, when 15 years of age, discovered a small enlargement below the left groin, and soon afterwards, while performing gymnastic exercise, he was seized with severe pain in the right side, which was supposed to proceed from an inguinal hernia This was reduced and a truss applied, but the region above the pad remained enlarged, especially after walking or exertion. The tumor on the right side descended lower than on the left, but the latter reached as far upwards as the orifice of the inguinal canal, and was lobulated. The right tumor was more projecting, more regular, and softer. The skin was unchanged in color; its surface was regular, normal, and it was movable over the tumors. The swellings were movable over the deeper parts, were soft, could be compressed, felt like lipomata, and were reducible.

Subsequently,[2] in consequence of a subcutaneous abscess, a fistula was established at the level of the fold of the nates of the left side, about five centimetres from the anus, but did not communicate with the intestine. A few days after an operation for the radical cure of this fistula, the two inguinal tumors became painful, exquisitely sensitive, accompanied with a group of grave symptoms, under which the patient rapidly sank and died.

Autopsy.—The right tumor was situated, in greater part, under the cribriform fascia, in front of the aponeurosis of the psoas and abductors, consisted of lobes approximating each other, was definitely bounded above, below, and at the sides, but behind communicated with the deep lymphatic-vessels. From it was discharged, in great abundance, a rose-colored fluid. No hernia could be discovered, but

[1] Gaz. des Hôpitaux, July 5, 1864, and Amer. Jour. Med. Sci., Vol. XLIX., p. 246.

[2] The completed history of this case is to be found in No 114, Sept 29, 1864, p. 454, of the Gaz. des Hôpitaux.

varicose lymphatic vessels occupied the inguinal canal and the superior portion of the cord.

Upon removal of the peritoneum from the posterior abdominal wall, there was observed along the iliac vessels a mass of wrapped conduits rolled together, directed generally from below upwards. This condition existed on both sides. Towards the columns of the diaphragm these two masses approached, and were probably blended together under the diaphragm. These masses were formed by the dilatation of lymphatic vessels, and resembled exactly the design given by Breschet of the condition found in the case of Amussat. See Fig. 35.

In this connection I reproduce the cases of Petit and Aime-David, in neither of which was the diagnosis of lymph varices verified.

Case LXIII.[1]—A student for a year had noticed, more particularly after fatigue, a swelling in each groin, which was accompanied with some pain, extending down the thighs. Examination showed tumors in both groins without any change in the color of the skin. The tumors extended into the inguinal canals, were painful to the touch; the pain extended along the saphena, which region presented the characters of angioleucitis. The child left the lyceum and returned in eight days, carrying a double hernia bandage. The former condition returned; the tumors doubled in size; the limbs became œdematous and benumbed.

Case LXIV.[2]—Mulatto, about 30 years of age. In consequence of repeated angioleucitis a very extensive enlargement of the legs developed. At the internal region of the thighs there were present prominent tumors consisting of dilated lymph-vessels. The tumors were uneven, elastic, transparent, and under pressure receded into the abdomen.

Aime-David refers to another case observed by M. Denis, in which the tumors presented were analogous to those found in the patient of Petit. The patient also carried a double hydrocele.

The tumor observed by Petters (Case No. 54, *New Orleans Med. and Surg. Jour.*) in the right inguinal region of his patient, equalled in size a small apple and resembled a hernia. It "felt like a conglomeration of ascarides—like rebounding cords, which upon pressure with the finger became softer and more flaccid. Petters regarded this anomaly as a "venous plexus," but it consisted of the "glands of the right inguinal

[1] Petit, Gaz. des Hôpitaux, 1864, p. 482.
[2] Aime-David, Inaug. Thesis, Paris, 1865.

region transformed into cysts, of small walnut-size, filled with wine-yellow fluid. From the inner wall of these cysts, trabecular projections extended into the cavity, and it was possible to enter two dilated lymph-vessels, of crow-quill size, which connected the cysts with one another, so that a dilated vas efferens and afferens could be seen in each cyst. Upon puncture a yellowish fluid spouted from these cysts in a jet of several inches. Lymph-vessels and cysts together formed a conglomeration which it was difficult to unravel. The lymph-vessels in the vicinity and the thoracic duct showed considerable dilatation." This case was complicated with stenosis of both auriculo-ventricular orifices, enlargement of the heart, œdema, ascites and cirrhosis, and it does not seem possible to have correctly diagnosed the true nature of the inguinal tumor, which was only recognized after paracentesis.

In Amussat's case death speedily ensued, preceded by violent symptoms, which developed suddenly after a fatiguing walk; in Nélaton's, death followed, in a few days, an operation; and in Trélat's, it followed an operation for fistula in ano, unaccompanied with any trace of redness or inflammation about the wound, without erysipelas or any appearance of angioleucitis. In these cases, as also in those of Fetzer and Petit, the tumors had been mistaken for hernial sacs. It thus becomes important to differentiate them from herniæ. Gjorgjevic asserts that lymphangiectatic tumors may be confounded with reducible and irreducible tumors. Among the latter may be classed cold abscesses, cysts, and lipomata, which develop very slowly, like lymphangiectatic tumors, but from which they differ by their reducibleness, transparency, and indistinct feeling of fluctuation, resembling that of lipomata, but quite distinct from that of tumors containing fluid. Softness is a characteristic of lipomata, but the latter are fixed. They may be compressed, but not reduced. Lipomata are rarely developed symmetrically (Trélat), whilst the inguinal glands may be affected upon both sides. Of the reducible tumors they are most frequently mistaken for herniæ. Both, says Gjorgjevic, develop slowly; neither change the appearance and character of the covering integument; both increase in size during exercise and continued maintenance of the erect posture, and both usually recede in the horizontal posture. In the latter position, however, the

hernial tumors do not recede unaided, but the glandular tumors do. Aime-David insists that the existence of a dilatation of the lymphatic-vessels of a neighboring part would be presumptive of the character of the tumor. Drinkard invites attention to the differing compactness and consistency of the parts of the tumor in his case, and to the absence of any impulse on straining or coughing, the invariable size of the tumor, and history of the case, as sufficient to prevent a mistake in diagnosis. But in case 62 the history was suggestive of the presence of hernia, for the tumor in the right groin developed during violent exertion, and in case 69 the tumors developed gradually, were reducible at pleasure, and protruded immediately upon removal of the compressing appliances. In the debate which took place before the Surgical Society of Paris, when M. Trélat first presented his patient for examination, M. Verneuil "gave the opinion that the deep and intra-abdominal lymphatic vessels were dilated, and had perhaps been the point of the departure of the disease," which opinion was verified by the autopsy, but M. Trélat, in his report of the case, does not give the reasons which enabled Verneuil to arrive at so accurate a diagnosis. No reference is made, in any of the reports of the cases, to percussion as a means of diagnosis. But, perhaps, the only conclusive test must be derived from aspiration. The presence of a fluid, presenting the chemical and microscopical characters of lymph, would settle the diagnosis. A lobulated feel, or the sensation of a congeries of twisted cords, unattached and movable under the skin, or the continual presence of a swelling around the truss, as in Trélat's case, which enlarged when in the erect position, should excite a doubt as to the hernial character of the tumor. The case of Fetzer (65) presented concomitant phenomena which should remove all doubt as to the correctness of a diagnosis.

Case LXV.[1]—A girl, 16 years old, had, besides a double femoral hernia which had existed since her eighth year, upon her abdomen a ribbon-like stripe, commencing one inch below the navel, to the left of the linea alba, continuing to the left and upwards, and passing between the false ribs and the ileum, proceeding thence, becoming lighter in color and narrower, as far as the vertebral column. Upon this band, anteriorly upon the abdominal walls, one inch below the navel and

[1] Fetzer, Arch. f. Physiologische Heilkunde, 1849, p. 128.

two lines from the linea alba, was a conglomeration of several, perhaps eighteen, wart-like tumors, from the size of a male to that of a female nipple, and of the same color as the surrounding skin. They were painless, flaccid, could be pressed into the abdominal walls, but rose upon the removal of the pressure. From two of the protuberances a milk-like fluid exuded continually, drop by drop. The flow issued from a small red spot in the centre of the tumors, was increased by pressure upon any of the unruptured bodies. After standing a short time the fluid separated into a milky, turbid serum, rendered clear by ether, and a brighter, milky, large coagulum, which reddened upon exposure to the air. Fetzer removed with the scissors one of the protuberances, which was formed by a thinned cutis, and immediately from the opening issued in a stream a considerable quantity of the milky fluid, which was followed by great debility, languor, and a feeble pulse. The entire band was thickly studded with minute raised points. Into the opening, artificially made, a probe could be passed to the depth of one inch. Chemical analysis of the fluid by Prof. Köstlia, and microscopic examination by Prof. Schlossberger, proved it to be lymph.[1]

The history of the above case is incomplete, and, consequently, the true nature of the hernial tumors must remain in doubt, but the probability is they were similar to the masses of dilated lymphatic vessels found in cases 61 and 62. If such was their character the coincident diseased condition of the lymphatics of the abdominal wall becomes an important aid in determining a correct diagnosis. Not that such a condition is necessary to exclude the existence of true hernia, but that the concurrence of tumors resembling herniæ and dilatation of the lymphatic vessels of the abdominal parietes would determine the lymphatic nature of the tumors. This view is confirmed by the phenomena presented in the case of disease of the lymphatics of the abdominal integuments, with occasional discharge of large quantities of chylous urine, reported by William Roberts, which, so far as I know, is the only case on record, though not claimed to be congenital, that exhibits an analogous condition of the abdominal walls.

[1] The congenital origin of cases 50, 52, and 65 is somewhat doubtful, but the probability of some congenital defect of formation either of the glands or vessels is so strong that I have so classed them. Binet insists that the phenomena in Fetzer's case were due to a congenital lesion of the plexus of origin of the superficial tegumentary vessels. Billroth says congenital occlusion played an important part in producing the disease in Thilesen's case. Carswell (Patho. Anat. Art. Hyper.) expresses the opinion that the dilatation in Amussat's case was a malformation. The case is frequently referred to as Carswell's, but incorrectly.

It is perhaps not possible to diagnose such a condition of the lymph-vessels as was found in the case of Amussat, yet it is more than probable that the mistaken nature of the inguinal tumors, and the unfortunate application of the hernial truss, set up the inflammatory conditions which proved fatal. The acute symptoms were not unlike those present in the case reported by Graves and Stokes (No. 17, *N. O. Med. and Surg. Jour.*), in which the painful swelling in the left iliac fossa, mistaken for fecal accumulation, proved, on post-mortem examination, to be a mass of devastated lymph-glands and dilated lymph-vessels, which communicated with the thoracic duct.

Case LXVI.[1]—W. R., aged 45, admitted to the Royal Infirmary, Sept. 21, 1868. Two years previously he began to suffer from a succession of abscesses; one appeared on the buttock, another on the right breast, a third in the left groin, and a fourth in the right iliac region, two inches from the middle line, and midway between the horizontal level of the umbilicus and the pubis. The last formed opened and refilled several times. After all had healed, he noticed a scab over the site of the fourth, which he removed, and immediately a pale, watery fluid, like gum-water, began to exude, and continued until several pints were lost. At this time he observed a number of transparent vesicles, not larger than pins' heads, scattered over the abdomen, occupying the hypogastric region from the umbilicus to the pubis, extending considerably more to the right than to the left of the middle line, thickest near the centre of the hypogastrium, and smaller and more sparse towards the confines of the affected region. A cluster of large vesicles is situated near the umbilicus, and another larger cluster is near the upper and right external limit, as shown in Fig. 36.

Some of the groups contain three or four, others eight or ten, vesicles, closely aggregated together. Some are so small that they are just visible. Most of them are hemispherical, but some are oblong or irregular, as if two or more had coalesced. In the smaller vesicles the membrane is transparent, without a trace of organization, their opaque white contents shining through them like drops of rich milk; but a few of the largest are distinctly marked by meandering lines of delicate blood-vessels, giving them a faint rose color. They varied in color and fulness—the whiter the more distended, and when pale they were flaccid. The color was also affected by the state of the patient's health, and by the digestion and assimilation of food; when feverish they were pale, but when the appetite and sleep returned they became milky and turgid. As his health finally declined the milky appearance became less marked, and in the last week of his life they became permanently pale and flaccid. They were paler in the morning before breakfast, after the prolonged fast of the night. Soon after

[1] Roberts, Manchester Med. and Surg. Repts., Vol. I., p. 104, 1870.

breakfast they began to grow fuller and whiter, which increased through the day and attained its maximum about eight hours after dinner. The discharge followed the same rule. When a vesicle was gently pressed it immediately emptied, its contents escaping into deeper parts, but returning as soon as the pressure was removed. They did not communicate with each other, but after a copious discharge all became empty.

Fig. 36.

The skin over the affected area was thickened, soft, and of a dull red color. The dull red area extended beyond the limits of the vesicles. Around the larger vesicles and groups of vesicles, the skin was raised into soft, nipple-like elevations, and was spongy.

The discharge, which sometimes was equivalent to eight ounces per hour, was always, whether milky or opalescent, essentially the same. After standing it separated into a clot and serum; coagulated with heat and nitric acid. When shaken with an equal bulk of ether the white appearance disappeared and it became transparent like blood serum. It was always alkaline, and contained fibrin, albumen, and fat. The varying degree of milkiness was due to the varying quantity of fat. Under the microscope myriads of fine fat molecules were seen sometimes mixed with larger oil globules; in addition to

these, pale corpuscles, identical in structure with white blood and chyle corpuscles, were always present, but not in large numbers.

The condition of the urine was carefully noted during the progress of the case. It varied in quantity from 13 to 40 ounces per day, was most abundant when there was no discharge from the vesicles. Its specific gravity varied from 1025 to 1032. On several occasions the urine was chylous, and on microscopic and chemical examination, excepting the ordinary constituents of urine, presented all the characters of the milky discharge.

This condition continued for several years, without any very marked effect upon his general health until pulmonary phthisis set in, which speedly terminated in death.

Autopsy, twenty-one hours after death.—Both lungs were studded with gray granulations, intermixed with larger masses of gray and yellow tubercles, some of which were softened. Two small vomicæ were found in the left apex and one in the right. Tuberculous ulcers were found in the small and large intestines. The bronchial and mesenteric glands were enlarged. The liver weighed sixty-four ounces, and the spleen nine ounces; both organs were healthy. The kidneys and bladder were healthy. The integument of the hypogastrium was much thickened and spongy, contrasting strongly with the emaciated skin over the thorax. The lining membrane of the bladder appeared smooth, glistening, and healthy. Nothing abnormal about the thoracic duct or lymphatic vessels or glands could be detected.

Examination of a portion of the diseased skin. A vertical section exhibited disease of the cutis vera and the subcutaneous tissue. The tendinous, muscular, and peritoneal strata of the abdominal wall were normal. The skin was immensely thickened, and formed with the subcutaneous tissue a pad, varying from a half to an inch in thickness. When fresh, the cut surface had a pale rose and somewhat fleshy or glandular appearance. It was traversed by short ducts or lacunæ, varying from the width of a crow's quill to that of a hair. On microscopic examination the lacunæ could be seen to communicate freely with each other by small orifices. The vesicles constituted the surface boundaries of the superficial lacunæ. The lining membrane of the vesicles and of the lacunæ was smooth, glistening, and lined with spherical nucleated cells.

The group of cases numbered from 49 to 66 (both inclusive) present a variety of morbid conditions and afford opportunity for a careful study of several of the phenomena present in my case (No. 1). The nipple-shaped bodies, which were located upon the anterior and inner aspect of the leg (see Fig. 1), were not unlike in appearance similarly described protuberances found in the cases of Fetzer and Roberts. In the latter cases, however, the bodies were lymph-sacs in direct communication

with dilated lymph-vessels. In my case the tumors were mainly composed of connective tissue, in the centre of which was a sinus filled with blood. During the life of the child it was manifest that they contained a fluid, for they were partially depressible and were believed to communicate with each other, though no communication could be discovered with the enlarged vein on the outer aspect of the limb. The minute bluish colored puncta about the apices of these bodies were the terminal ends of venous radicles, and their supply of blood was derived through branches from the enlarged vein, which also sent branches to the nævus enclosing the group of vesicles located on the outer aspect of the limb. The connective tissue hyperplasia was due to venous stasis. During the progress of the case reported by Friedberg (48), a nævus developed upon the dorsum of the left hand and blood-vesicles formed upon the left arm. It may be that these bodies were in the beginning blood-vesicles, and failing to rupture, a new growth of connective tissue was set up, or, perhaps, they were hypertrophied papillæ, similar in structure to the prominences described in the following case:

Case LXVII.[1]—The patient was affected by a chronic swelling with induration and cutaneous hypertrophy of the scrotum, of the inguinal regions, and of the two thighs as far as below the knees. The thickened skin was covered here and there with rounded prominences, firm to the touch, sessile, but little vascular. One variety was manifestly due to the hypertrophy of the papillæ, and the other enclosed ampullar dilatations of the lymphatic vessels. From the latter, when excoriated or pricked, oozed in variable quantities a lemon-colored liquid, slightly viscid, transparent, like a weak solution of gum-water. In the left inguinal fold there were two soft prominences, violet colored, fluctuating, and covered with a crust, on the removal of which there escaped a quantity of fluid similar to that above described. The patient had frequently recurring inflammatory attacks, which always caused an augmentation of the affected parts, which progressive increase always proceeded from above downwards.

M. Verneuil rejected the hypothesis of elephantiasis arabum, and insisted that it was a special variety of hypertrophy which was connected with a dilatation of the superficial lymphatic vessels.

[1] M. Verneuil, Bull. d. la Société Imperiale de Chirurgie de Paris, 2d series, Vol. 8, p. 312, 1868. Meeting, July 17, 1867. Non-congenital.

In the discussion which took place Demarquay admitted the dilatation of the lymph-vessels, but insisted that the hypertrophy was elephantiatic because of the extent of tissue involved, the small quantity of fluid discharged, and the absence of a jet, which, he erroneously maintained, is the invariable manner of escape of the fluid from a varix of the superficial lymphatic network. In this view M. Trélat coincided, and held, furthermore, that the dilatation of the deep network of lymph-vessels was not established, for in all such cases there was found "a circumscribed tumor of greater or less extent, without alteration of the skin," which might be mistaken for a hernia or a lipoma. The extent of the hypertrophy, induration of the tissues and papillary growths, M. Trélat's assertion to the contrary notwithstanding, do not antagonize the hypothesis of M. Verneuil, for in a number of cases previously cited similar morbid conditions were manifestly associated with dilatation and occlusion of lymph-channels. M. Panas had seen two cases of dilatation of the superficial lymphatic network of the scrotum, but neither had anything analogous to the case of M. Verneuil. In both of his cases the fluid was evacuated by puncture and escaped with a jet. In one case the lymphatic dilatation followed a balanitis. The essential question in dispute related to the priority of the conditions—whether the elephantiasis or the disease of the lymphatics was the primary condition. In cases like this, in which "the affection began without known cause, by violent pains and inflammatory swelling," the usual course of the acquired forms, it is not easy to settle the priority of conditions, for usually, when unaccompanied with a discharge, the affection is not observed until pain and swelling are present. In those cases in which discharge occurs prior to the onset of the symptoms which are so markedly present in elephantiatic developments, the question of priority is settled in favor of the primary affection of the lymph-vascular system, and in such cases, especially of the acquired forms, the subsequent progress does not differ materially from those cases where the first observable phenomena are characterized by pain and inflammatory swelling, such as occurs in elephantiasis arabum, which it is claimed produces stenosis and obliteration of lymph-vessels, and consequently dilatation of vessels, stasis of lymph, induration and hypertrophy of the tissues. It cannot, however, be

denied that inflammatory processes, either erysipelatous or elephantoid, do constitute the beginning of many of the cases of hypertrophic development, which are characterized by all the phenomena which I have ascribed to occlusion and dilatation of lymph-channels, and consequent stasis of lymph. But this fact does not antagonize my view, for it is admitted that such changes as result from the inflammatory processes necessarily cause lymphangiectasis, and the argument relates to the effects, not the causes of the stasis of lymph. I have previously referred to the suggestion that the congenital cases of ectasia, stenosis, and obliteration of lymph-channels may have been caused by inflammatory conditions taking place during intra-uterine life, and am willing to accept this hypothesis as a probable explanation, but the numerous cases of congenital defect of formation of portions of the lymphatic system, accompanied with hypertrophic enlargements, will not admit of its universal application. The one essential condition is interruption to the current and detention of the lymph, it matters not whether it be caused by devastated glands, absence of valves, absence of anastomotic connection between the superficial and deep-seated system of vessels, or other congenital or acquired conditions.

Of the previously cited cases only in cases 1, 9, 65, 66, and 67 have the nipple-shaped bodies been observed. In the cases of Fetzer and Roberts and my own (No. 1) the protuberances seem to have been similar in form, but in the latter they differed in structure from those in the former two cases. In case 9 they are described as dense, hard, fibrous tubercles, like those seen in tubercular leprosy, studding here and there the rugose, dense, and hardened skin. In case 67 there were two varieties of prominences—one hypertrophied papillæ, the other ampullar dilatation of lymphatic vessels. Thus it appears that these prominences present themselves in four distinct varieties —as fibroma, as seen in case 9; as hypertrophied papillæ, as in Verneuil's case; as vascular cavernous growths, to which class the bodies in case 1 belong, and as ampullar dilatations of lymphatic vessels, as presented in cases 65, 66, and 67. Any two or more of these varieties may coexist in the same subject. In Smith's case (No. 9) the tubercular fibroma sprung from a densely hardened and thickened skin, occupied with a spongy,

erectile, venous, cavernous tissue, and in case 1 the bodies consisted of connective tissue and blood-vessels resting upon a spongy vascular tissue. In both cases (1 and 9) the bodies were found in immediate connection with phlebectasis and stasis of venous blood, and consisted in case 9 wholly, and in case 1 mainly, of newly formed connective tissue—a verification of the relation of stasis of venous blood to connective tissue hyperplasia. In case 65 there were a number of these wart-like tumors, varying in size from that of a male to that of a female nipple, which could be pressed into the abdominal wall, but rose again upon the removal of the pressure. Fetzer removed one of these bodies and passed a probe through the opening to the depth of one inch. From this opening a large quantity of milky fluid escaped in a stream. The communication between these ampullar dilatations and the lymph-cavernous structure beneath was thus demonstrated to be an open and direct channel, but in Roberts's case they were not intercommunicating, but depressible ,and seemed to communicate with a deeply situated reservoir of anastomosing channels. The thickened skin and subcutaneous tissue were traversed by short channels or lacunæ, varying from the size of a hair to that of a crow's quill, which seemed to communicate freely with each other by small, smooth orifices. The nipple-shaped bodies and the vesicles evidently "constituted the surface boundaries of the more superficial lacunæ." Analogous elevations will be considered hereafter.

Vesicular formations or cutaneous vesicles, variously described by different writers as ampullæ, bladder-like sacs, or cystic degenerations of the terminal ends of lymph-channels, are phenomena very constantly associated with hypertrophies, in which the lymphatic system is mainly involved. These dilatations of the lymph-plexuses of origin, as they are denominated by Binet and Phillipe Aime-David, are more or less prominent, hemispherical, usually transparent, not always depressible, vary in size, in the beginning not often exceeding the size of a pin's head or a lentil, and enlarging at a more advanced period, but not often projecting more than a line and a half above the cutaneous surface. The larger the vesicles, the more markedly ampullar, forming sacs with constricted necks. They often rupture spontaneously, and are always easily perforated with a

pointed instrument, discharging a slightly alkaline, viscid fluid, usually having a milky color, and varying in quantity, sometimes escaping in a continuous stream, at other times drop by drop, or in a jet. The quantity discharged may be increased by the erect posture, by movements of the neighboring muscles, or by pressure along the course of the connecting lymphatic vessels. When the body is placed in a horizontal position they usually diminish in size or fulness, and, if ruptured, cease discharging. The fluid evacuated stiffens on cooling, coagulates on exposure to the air, and is, chemically and microscopically, analagous to lymph. Cruveilhier[1] encountered pus several times in ampullar lymphatic varices, and others have occasionally found a fluid more or less mixed with blood and other extraneous matters. When depressible they retake their form upon removal of the pressure. These ampullar dilatations of the terminal extremities of the lymphatic capillaries, or more properly of the lymph-spaces, are usually found in groups of closely aggregated vesicles, though not observing, as maintained by several observers, any definite order of arrangement, and have a predilection for localities rich in the superficial plexuses and where the trunkal vessels are more developed and so disposed as to suffer distention from accumulation of lymph, such as the upper anterior and posterior surfaces of the thigh, malleolar regions, anterior abdominal walls, scrotum, and prepuce. When at their most advanced development (Binet), they allow the lymph to flow from one to another, and are always associated with dilatation of connecting subcutaneous vessels, which may be cylindrical in form, feeling like hard, knotted, flexible, mobile cord, or moniliform—seeming to be constituted of a series of little bladders placed one following the other, or they may communicate with a lymph-cavernous structure lying beneath. When the vesicular formations are covered with the cutis they may develop to the size of a male or female nipple, or even larger. When beneath the skin, involving the subcutaneous vessels only, they are usually much larger and feel like rounded tumors, more or less voluminous, but are not adherent to the skin. The movable cyst-like subcutaneous body which was located upon the inner surface of the knee-joint in case 1, and which disappeared spontaneously

[1] Traité d'Anat. Patholog. Gen. Paris, 1852, T. II., p. 823.

during the first month of the child's life, was, perhaps, an illustration of this latter variety of ampullar dilatation. In Paterson's case (No. 57), a cyst-like protuberance formed during the lifetime of the infant, which proved on examination to be a "conglobate" formation of varicose lymphatic channels. In the cases of Amussat, Drinkard, and Fetzer (60, 61, and 63), the tumors, mistaken for herniæ, consisted of a congeries of dilated and distended lymph-vessels, so interwoven as to convey the sensation of sacs.

Demarquay's case (No. 50) was characterized by a series of little depressible vesicles grouped around each other, which developed slowly and spontaneously, were enlarged when walking and diminished with rest. Attention was first awakened by the discharge of lymph, and, subsequently, the flow was increased by pressure above and below the rupture. The fluid collected by Lebert separated on cooling into a clear fluid and a yellowish clot. Lymph-cells and red blood-corpuscles were held in suspension. Quevenne's analysis showed marked similarity to blood. The serum resembled milk, and contained sugar. The nature of the discharged fluid and the direct continuity of the vesicles being thus established, the succession of the morbid phenomena become exceedingly interesting and instructive. The lymphorrhagia commenced during active, and perhaps violent exercise, when the accumulation of lymph became excessive, consequent upon active muscular movements and stasis occasioned by occluded vessels or impermeable glands. Valvular insufficiency existed, either as a congenital defect of formation, or resulted from excessive vascular distention, and a reflux current ensued. The walls of the vessels were gradually thinned, the ampullar dilatations developed slowly and gradually, and rupture followed consequent upon the persistent passive accumulation. Subsequent to these phenomena tumefaction, hypertrophic enlargement of the neighboring soft parts, took place. Thus the histogenic relation of lymph-stasis becomes an observed phenomenon.

No less remarkable, and even more instructive, is the case of Thilesen (No. 52). A boy, aged 19, had from infancy a perfectly smooth painless tumor of the skin, sharply defined above by Poupart's ligament and extending downwards towards the knee. After a time the skin, especially upon the anterior and

inner aspect of the thigh, towards the scrotum—a region rich in lymphatic networks and anastomoses—thinned in places, presenting small, shining, slightly elevated spots, similar, probably, to the cicatricial spots observed in my own case. These spots, when ruptured, either spontaneously or by violent effort, discharged a yellowish-white, opalescent, coagulable fluid, which sometimes escaped in jets. Subsequently, the enlargement increased, and extended downwards, involving the leg and foot, and many of the former thinned skinned shining spots developed into transparent vesicles, distended with fluid, which on microscopic examination exhibited the usual characteristics of lymph. Similar thinned skinned spots formed upon the foot, especially upon the plantar surface and between the toes, and numerous vesicular projections formed upon other parts of the limb, especially upon the inner surface of the thigh, varying in size, the largest not exceeding one and a half lines in height, and looking like shining spots in the hypertrophied integument. They were broader at their apices than at their bases, depressible, and refilling with the recurrent fluid, and could be directly traced into the superficial vessels, some of which were dilated to the size of a crow's quill. Beneath the thickened, firm, compact integument covering the inner surface of the thigh, in the region where the ampullar varices were most abundant, several deep-seated, hard cords could be distinguished. No thinned spots or vesicles appeared upon the leg or dorsum of the foot, though the integument was thickened over the entire surface of the hypertrophied parts. The lymphatic varices, either in the form of shining spots or distinct and elevated vesicles, were only found in regions of the thigh where finely meshed lymphatic networks are distributed through the integument, and on the plantar surface and sides (Thilesen) of the toes, where the richest lymph networks of the lower extremity are found. The hypertrophy of the integument developed *pari passu* with the degree and extent of the lymph-stasis, and was most marked in those localities where the evidences of the accumulation of the fluid were most manifest.

The slow and spontaneous development of the wart-like tumors in M. Fetzer's case (65), the effacement of the prominences by pressure, their locality in a region rich in plexuses, the reflux current from one to another, their grouping near together, their thin

integumental covering, the easy introduction of a probe to the right or left, and the chemical and microscopical analogy of the fluid with "milk," establish the nature of the lesion, the connection of the varices of the superficial integumental plexuses with ectasia of the deeper-seated vessels, and points (Binet) to congenital defect of the terminal extremities of lymphatic channels. It may be that the inguinal tumors, mistaken, as in Amussat's case (60), for herniæ, were ampullar dilatations of lymphatic vessels; or that the pressure of the truss occluded certain vessels, thus developing a congenital defect in the structure of the superficial plexuses. The suggestion of Aime-David, that the lesion resulted from the pressure of the stays upon the abdominal parietes, is hardly tenable, in view of the anatomical connection of the superficial lymphatics of the abdominal walls with the inguinal glands.

Lymphangiectasiæ assume a variety of forms. Lebert[1] divides varices of the lymphatics into three forms: 1st, groups of closely aggregated vesicles, varying in size from a pin's head to a lentil; 2d, more voluminous ampullæ connecting directly with neighboring vessels undergoing cylindrical dilatation; and 3d, varices of regions of vessels forming a mass of varices. Cruveilhier[2] divides them into two varieties—the ampullar and cylindrical, or non-circumscribed varices. This division, suggests Binet, is only applicable to the varices of the vessels of the lower extremities, and are analogous to the forms of venous varicosities, though less frequent—their infrequency being due to the absence of any propelling organ, the greater resistance of the vascular walls to the lateral pressure of the fluid, to the resistance offered by the valves to a reflux current, and to the static force of the superimposed column of fluid. Aime-David makes two divisions—the traumatic and spontaneous. The latter being exclusively confined to regions rich in the distribution of vessels and plexuses.

Among the congenital cases there are illustrations of several varieties. The moniliform, in which the integrity of the valves is preserved, giving to the vessel a knotted, rosary-like form, as if constituted of a series of bladders placed one by the side of

[1] Traité d'Anatomie Pathologique Générale et Spéciale, Paris, 1857, T. I., p. 548.

[2] Traité d'Anatomie Pathologique, T. II., p. 823, 1853.

the other. When exaggerated the vessel becomes cylindrical, which involves valvular insufficiency. This form may be limited to a part, or to a single vessel, or may involve a number of neighboring vessels, presenting the character of sac-like tumors, or may extend to the vessels of an entire limb, and, as in Amussat's case and the case of the new-born calf (59), an extensive region of internal vessels may be implicated.

The cavernous dilatation is but an exaggeration of the cystoid form, but may find its origin in an expansion of lymph-capillaries; in either case the size of the caverns depends upon the coalescence of smaller cysts or expanded capillaries, through atrophy of the intervening septa. The superficial ampullæ, and small cysts found in the parenchyma of the diseased part are, I think, formed in congenital cases in like manner, and are usually the dilatation of the lymph-canaliculi of Recklinghausen, assuming the cystoid form when situated in the parenchyma, and the ampullar when bulging from the surface. The cavernous tumor may result from the continuous coalescence of caverns and cysts by continual atrophy of intervening walls, and the entire parenchyma of a part may be transformed into a cavernous trabecular tissue by extension of the lymph-stasis, involving the entire system of lymph-canaliculi. When the accumulation is confined or extends to the canaliculi of the integument, gradual thinning of the epidermis takes place in consequence of the continuous presence and constant oscillation of the accumulated fluid, eventuating in the formation of vesicles, projecting above the surface. The lymph-canalicular system is without valves, and free intercommunication is preserved through the (proto-plasmic) processes (of the branched cells of Klein). Ectasia might thus ensue, either from stasis resulting from occlusion of neighboring trunks, or from impermeable glands, or from the constant oscillation of the fluid due to the congenital defect, or absence of valves in the capillaries. Weber says, the cystoid dilatations have been observed upon the thoracic duct, and Lebert refers to ampullar dilatations of trunkal vessels. Such is not improbable, thus presenting an aneurismal form, but no such instance exists among the congenital cases.

The ampullar or vesicular dilatations may find their cause in ectasia of the terminal ends of the central lymph capillary

of the papillæ of the skin. This mode of origin occurs quite frequently among the acquired cases, and is undoubtedly the mode of formation of the vesicles usually present in elephantiasis arabum, but as it involves an inflammatory process which is absent in the congenital cases, with, perhaps, the exception of Demarquay's case (50), it is not probable that the vesicles in any of these cases are the dilated lymph-capillaries of the cutaneous papillæ.

The lymphatics of the skin[1] consist of "definite canals" with walls, and spaces "which are the interstices in the tissue of the skin." The lymph-vessels of the subcutaneous cellular tissue anastomose very freely, and running towards the corium form two networks, one situated below the outer, and the other beneath the lower capillary blood vascular plexus. These lymphatic networks anastomose less freely than the subcutaneous system of vessels. The interstices of the corium are filled with a serous fluid, and in œdematous conditions "aro for the most part the seat of the effusion." The communication of these serous interstices or lymph-spaces with the lymphatic vessels proper has not been demonstrated. Neumann maintains that the lymph capillary systems of the skin are closed canals without stomata, unconnected with the mesh-spaces and that the inner plexus is abundantly distributed to the hair and sebaceous follicles, to the fat tissue, sweat-glands, and throughout the connective tissue. The lymph and blood capillaries are independent of each other, yet their anatomical, and perhaps histological, relation is worthy of notice, especially as, in œdematous conditions of the skin, this relation appears more immediate and direct. The lymphatics are accompanied by one or two blood-capillaries, which lie close to their walls, often encroaching upon the cavities of the lymph-capillaries. In man the blood-capillaries, like the larger vessels, "are surrounded by parallel connective-tissue fibres, between which and the walls lie the perivascular lymph-spaces. Klein[2] claims to have demonstrated the open continuity of the peribronchial lymph-spaces with the lumen of the bronchial tubes, and it is not improbable that further research will establish a similar anatomical relation of the perivascular lymphatics with the lumen of the

[1] Biesiadecki, Stricker's Manual, Amer. Trans., p. 542.
[2] Anatomy of the Lymphatics of the Lungs.

blood-vessels. Küss locates the base of the lymphatic cone at the epithelia.

Biesiadecki denies that the papillæ of the skin in a normal condition are supplied with lymph-vessels. Teichmann, however, holds the opposite view, but admits that the central vessels of the papillæ never reach entirely to the apex, sometimes forming only a slight projection into their bases, and at other places extending half way the height of the papillæ, but that every papillæ is not provided with a central lymph-vessel. When found they are derived from the outer network. In the skin of an elephantiatic leg he found, with few exceptions, the papillæ supplied with lymph-vessels, extending generally from two-thirds to three-fourths their length, greatly enlarged, and usually dividing near the bases of the papillæ into two vessels which emptied into the superficial network. The accompanying figure (37) from Teichmann[1] illustrates these conditions.

FIG. 37.

"Perpendicular section through the integument of the sole of a foot affected by elephantiasis; *aa*, the cul-de-sac-like starting-point of the lymph-vessels in the enlarged papillæ; *b*, vessels of external layer; *c*, vessels of internal layer. The vessels of the internal layer are collapsed, their dimensions are not therefore corresponding to their width."

Odenius[2] in a case of lymphorrhagic pachydermia, in which the vesicular formations were confined to the inner aspect of

[1] Das Saugadersystem, p. 62, Leipzig, 1841.
[2] Deutsche Klinik, 1874, p. 385.

the left thigh, about six inches above the knee, found distinctly marked open ducts leading through the bases of the papillæ into the superficial lymph network, and beneath the surface of the cutis he found "wide, canal-like caverns or cavities," from which branches extended upward towards the papillæ and downwards into the deeper tissues of the skin. The arrangement of the lymph tracks differed from that described by Teichmann, in that a majority of the canals which ran deep into the tissues, as well as a portion of those which ran horizontally, presented equal contours and a rounded form, while others possessed an irregular, angular, sinuous boundary, and a lumen irregularly enlarged. The exuded fluid presented all the characteristics of lymph, containing an unusually large proportion of fat. These observations of Teichmann and Odenius, so contradictory of the opinion of Biesiadecki and others, suggest the inquiry whether the central lymph-vessel of a papilla, when found, is a newly formed or a preformed vessel. Odenius found the papillæ, for the most part, which did not participate in the vesicle formation, "small and without any sign of a cavity," even in their bases, but in certain isolated cases he recognized tracks or sinuses extending from the superficial network more or less into the papillæ, which he claims represent the first stage of vesiculation, and he corroborates the supposition that the central lymph-vessel of a papilla, when found, is a newly formed vessel. He insists that the "horizontal canals which pass upward towards the papillæ are mere excavations in the tissues and not dilated preformed vessels." The lymph-spaces acquire a free communication with the lymph-vessels proper and afford efflux to the advancing fluid, which, as the dilatation of the cavity progresses through the papilla, forces its way to the epidermis and collects in a vesicle. In this manner Odenius explains the varying development of a central lymph-vessel, sometimes entirely through the centre and terminating in a vesicle, at other places simply presenting a pouch-like projection into the base of a papilla, the varying gradations of development depending upon the duration of the morbid process.

It cannot be doubted that the vesicle formations in the case of Odenius, and probably also in the case of Teichmann, were directly connected, through open canals, with the lymph-vessels,

for the vesicles characterized themselves as true lymphangiectasiæ, but it cannot be maintained that all lymphatic vesicle formations are the terminal ampullar dilatations of newly-formed lymph-vessels, which have, by gradual and continuous development, penetrated the cutaneous papillæ, or that they bear any anatomical relation whatever to the papillæ. In many cases, perhaps in most, they are true ectasiæ of the serous spaces or the lymphatic radicles of the integument. The cases of Odenius and Teichmann were associated with inflammatory processes, and the vesicles, as in many diseases involving the structure of the skin, were immediately connected with the changes effected by the inflammation.

M. Michel, of Strasburg (Binet), has twice observed papillated and whitened patches, several centimetres in extent, on the internal surface of the thigh, which he considered an exaggeration of the normal condition, but Binet regards such appearances as a "pathological alteration of the lymphatic capillaries." He insists that almost the entire surface of the body is covered by capillaries of extreme tenuity, but that certain localities are richer in plexuses than others, and only in the parts where these plexuses are so abundantly developed are "varices of the plexus" or vesicles to be found.

C. Handfield Jones[1] has reported three cases of "dilatation of the lymphatic radicles," which presented a plexiform arrangement of freely intercommunicating "vasoid spaces" lying immediately beneath the epidermis, seeming to groove the corium, and disappearing at the localities where the superficial vessels passed into the tissues to unite with the deeper lymphatic vessels. The intercommunication of these sub-epidermal vasoid spaces and the direction of the current of the lymph was demonstrated by the rapidity and continuousness of the discharge from a needle puncture. Jones does not describe any vesicle formations, such as have been usually observed, but suggests that the excessive transudation of lymph found efflux through the dilated serous spaces, communicating one with another along a continuous course, and finally emptying into the deeper system of vessels. This form of varix had not been previously described, and may, perhaps, have been an exaggeration of the condition of "wide, canal-like caverns, or cavities,"

[1] London Lancet, July 31, 1875.

observed by Odenius, but without vesicles. Venous obstruction was present in all of these cases, to which circumstance Jones attributes the peculiarity of the form of the varices, for only through the lymph-channels could the œdematous fluid find egress from the tissues.

The cases of "lymph scrotum," more properly cases of pachydermia lymphangiectatica (Rindfleisch), reported by Carter, Manson, Wiedel, and others, present vesicle formations "in the form of cavities which have their seat in the uppermost layer of the cutis itself," and project above the surface in vesicles of varying size. All these cases belong to the acquired forms, but to illustrate this variety of lymph-varices I have selected the case of the adult Hindoo, reported by Carter,[1] which presents a number of interesting phenomena.

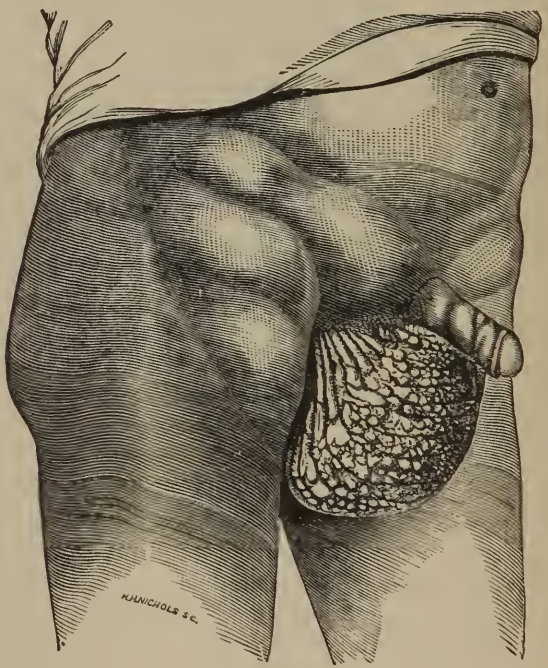


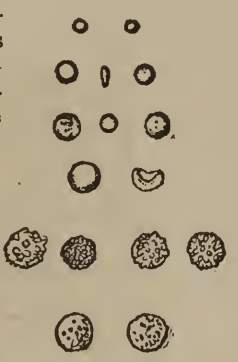
FIG. 38.

CASE LXVIII.—The skin of the scrotum was corrugated, thickened, and studded with numerous tubercles, varying in size from a

[1] Medico-Chirurgical Trans., vol. 45, p. 189, 1862.

pin's head to a pea, soft to the touch, and when punctured discharged a chylous fluid, sometimes equalling a pound daily. Sometimes it issued spontaneously from one or more of the tubercles. When it ceased, and occasionally during its continuance, the urine became chylous and frequently coagulated. The inguinal glands on both sides were much enlarged (see Fig. 38), soft, doughy, and diminished under pressure. The tumefaction of these glands seemed to alternate with the appearance of chyle in the urine, and increased two or three hours after a full meal and then subsided. The appearance of chyle in the urine was irregular, when chylous it was either white, reddish-white, or pinkish, with a subsequent deposit of blood-corpuscles. It usually coagulated more or less completely, the clot assuming a rose color. The quantity was greatly increased; decomposed rapidly. Sp. grav., 1.017.

The fluid discharged from the scrotum while flowing assumed a red color, coagulated very rapidly, the clot being red and the serum milky. It consisted of a molecular base, granules, red blood-corpuscles, some well-formed, some granular and starred; corpuscles rather larger than these, with color less decided and margins slightly irregular; others having a mulberry aspect, varying in size and sometimes flattened; lastly, granular corpuscles, $\frac{1}{2700}$ of an inch in diameter, and resembling lymph-corpuscles. The blood serum was quite clear.



Lymph (chyle ?) from the scrotum.
a. Red blood-corpuscles $\frac{1}{4000}$ to $\frac{1}{6000}$ inch in diameter, some granular and starred.
b. Corpuscles rather larger ($\frac{1}{3500}$ to $\frac{1}{2666}$ in.), but like them; color less decided, and margins less irregular; numerous.
c. Numerous nuclei, varying in size ($\frac{1}{3500}$ to $\frac{1}{2500}$ in.); some mulberry-shape, some flattened.
d. White blood-corpuscles, very few; $\frac{1}{2700}$ in.; fibrinous striæ.

FIG. 39.

As a rule, the chyluria appeared with the cessation of the discharge from the scrotal vesicles and alternated with the tumefaction of the inguinal glands. These facts, though insufficent to establish the hypothesis of Carter (see *N. O. Med. and Surg. Jour.*, July, 1877), that the fluid was chyle, which by a retrograde movement found its way to the scrotum, inguinal glands, and bladder, do establish the identity of the fluid which collected in the inguinal glands, and which was alternately emitted from the scrotal vesicles and bladder. The three conditions were directly connected, and manifestly due to stasis of lymph. In Carter's case, impediment to the lymph-stream was

above the superficial inguinal ganglia. He ascribed the enlargement of the glands to increased function, in connection with dilated vessels extending inwards, even as high as the thoracic duct.

The cases of Roberts and Carter (66 and 68) are pathologically identical, and the absolute identity of the discharges with lymph, or chyle, establish the similarity of the structures and of the morbid processes producing them. The objective phenomena in both cases consisted of obstructed and dilated lymph-channels and stasis of lymph, and in each case the lymphorrhagia alternated with the chyluria. It may, then (Roberts), be assumed that the condition producing the chylous urine was essentially of the same pathological nature as the disease of the abdominal walls in Roberts's case, and of the scrotum in Carter's case. Roberts suspected from the discovery of the Bilharzia hæmatobia in endemic hæmaturia that chyluria might owe its origin to the presence of parasites in the lymphatic vessels, which supposition has been verified by the more recent discovery, by Lewis, of the filiaria in cases of chylous urine, and, by Winckel (Case 45, *N. O. Med. and Surg. Jour.*), in a case of chylous ascites. Lewis supposed these parasites penetrated the walls of the lymph-channels, thus establishing apertures through which the fluid escaped. "Chylous urine," says Roberts, "prevails mostly in youth and middle-age, but no case has been traced to congenital origin." The youngest example Roberts refers to Prout, which occurred in a male infant eighteen months old, in which case a fatty substance mixed with triple phosphate was discovered "in the urine of a delicate child fed on milk."

The vesicles in cases of pachydermia lymphangiectatica are "partial (Rindfleisch) ampullar dilatations of the superficial subpapillary lymphatic net." The inner surface of these vesicles is always lined with lymphatic endothelium, and the covering is "formed by the epidermis and the papillary layer." Rindfleisch[1] insists that regions most usually invaded with this affection are the richest in organic muscle, which in the tunica dartos forms "a proper membranous organ." This structural element in this class of cases undergoes "a special hyperplasia and neoplasia," and by contraction compresses "the lymphatic

[1] Text-Book of Pathological Histology, Amer. Translation, p. 313, 1872.

trunks which penetrate the cutis in a straight direction, and connect the superficial with the deep lymphatic net," thus preventing efflux of the lymph and consequent ampullar dilatation of the terminal radicles. A similar effect might also follow simple elasticity of the muscular parenchyma. These pathohistological conditions might stand in an etiological relation to the cutaneous vesicles, but certainly they are insufficient to explain the glandular engorgement and chyluria, and it may be that the hypertrophy of the dartos is an effect rather than the cause of the stasis of lymph. In another of Carter's cases, and in one of Manson's cases of "lymph scrotum," a similar coexistence of phenomena was present; and in a number of the cases of "lymph scrotum," as in Wiedel's[1] case of pachydermia lymphangiectatica, the vesicles which studded the skin of the scrotum were directly associated with engorged inguinal glands. These circumstances would lead to the conclusion that the "ampullar dilatations of the superficial subpapillary lymphatic net," which Rindfleisch ascribes to hypertrophy of the organic muscle of the skin, were the remote effects of obstruction to the lymph-stream situated anatomically above the inguinal ganglia. In cases 54, 55, 56, 57, and 58 the vesicle formations were associated with cylindrical or moniliform varicosities of the connected vessels.

Among the acquired forms of lymphatic varices there are a number of cases (see the cases of Petters, Stewart, Bryk, Oppolzer, and Rokitansky, *N. O. Med. and Surg. Jour.*, September, 1877) in which lymph-varices were occasioned by obstructive heart circulation, and a number of other cases in which dilatation and rupture of lymph-channels occurred in consequence of impediment to the lymph-stream, located at or near the entrance of the thoracic duct into the left subclavian vein; but among the congenital cases, the case of Virchow (59), probably the case of Friedberg (48), and the following case reported by Cholmeley, are the only instances in which the heart circulation bore any causal relation to the lymph-varices:

Case LXIX.[2]—Louisa R., the fourteenth of seventeen children; was, like her brothers and sisters, born at full term, but was deeply cyanosed; her lips and fingers were dark blue, her face livid, and the

[1] Inaugural, Abhandlung, Würzburg, 1837.

[2] Cholmeley, Trans. Clin. Soc., London, vol. ii., p. 116, 1869.

general surface of the body dark. Respiration was very labored and sighing, and for many weeks it was not supposed that she could live. Suffered for the first four or five years from frequent attacks of dyspnœa, and "inflammation on the chest," but "was always well nourished and fat," and is now (1869) "short, stout, and generally healthy looking, with a good, bright red color in the cheeks and lips, but is easily affected by colds, and then complains of "want of breath," and a feeling of tightness in the chest; and at such times the complexion assumes a markedly livid tint, respiration becomes somewhat labored and noisy, the extremities cold, and the nails dark blue. No morbid sounds are heard in the lungs. The pulse is normal in frequency, rhythm, volume, and force; "but all over the heart is heard a soft, blowing, systolic murmur, which is loudest at the junction of the second left costal cartilage with the sternum."

During her sixth year a swelling appeared on her right leg and ankle, which gradually extended upwards, though not above the knee, until two years had elapsed; but in the third year, when the patient was between seven and eight, "the swelling extended slowly and steadily upwards till the whole limb was implicated," but has not gone above the "inguinal line." The increase in the size of the swelling was always greater towards the evening, and did not affect the foot when a boot was worn or when the child first got up, but was very great in the foot if the boot was not put on. When treated in 1867, by rest in bed with elevation of the foot, graduating bandages from the toes to the groin, and pressure on the femoral artery, "the swelling diminished considerably, but returned rapidly as soon as she was allowed to be about again."

At the date of the report the entire limb was uniformly enlarged, felt "soft, firm, and elastic"—the lower part being firmer and more tense than the upper—in color and temperature the limb did not differ. The skin was smooth and soft as far downwards as the middle third of the leg, below it was "harsh, rough, dry," and scaly. On the outer aspect of the ankle were a number of "soft, smooth, red flattened papules," not larger than a split pea. On the hypertrophied skin of the great, second, and third toes were "rough, hard elevations, looking much like a half-aborted and dried herpetic eruption," from which occasionally a discharge took place; and over the tendo-Achilles was a "humid patch, from which a milky-looking alkaline fluid dripped," similar in character to the fluid which issued through punctures made into the lower part of the limb, which exhibited under the microscope "broken-up cells, granular matter, some oil-globules, blood-corpuscles," and coagulated on boiling.

The comparative measurements of the lower extremities were as follows:

	Left.		*Right.*	
At the ankle	8	inches.	9⅝	inches.
Mid. leg	9	"	14	"
Below knee	9⅝	"	14¼	"
Above the knee	10¼	"	16¼	"
Upper part of the thigh	15	"	17¼	"

There was no fulness or swelling of any kind detected in the groin or pelvis; nothing abnormal in the condition of the right nympha or labium; never any pain in the limb, nor any injury, accident, or known cause to account for the condition."

The deeply cyanosed condition at birth, which never entirely disappeared; the frequent attacks of dyspnœa, which were always accompanied with increased lividity of the face and finger nails, and the "blowing, systolic murmur," which was loudest at the junction of the second left costal cartilage with the sternum, which was probably due to some congenital defect—all point to cardiac anomaly, and cannot, in view of the clinical histories and post-mortem appearances furnished by the cases of Stewart, Rokitansky, and Petters (see *N. O. Med. and Surg. Jour.*, Sept., 1877), be dissociated from a causal connection with the stasis of lymph, which first manifested itself near the ankle during the sixth year, and which gradually increased until the entire system of superficial lymph-vessels of the limb seem to have become involved. In Virchow's case (59), a thrombus partly lying in the outlet of the external jugular vein so occluded the mouth of the thoracic duct, "that nearly all the internal organs were dilated to the utmost by ectatic lymph-vessels. The intestines were covered everywhere with broad bead-like canals." In Stewart's case (No. 55, *N. O. Med. and Surg. Jour.*), "the heart was hypertrophied and fatty, the aortic valves much diseased and covered with vegetations; the auriculo-ventricular orifices were dilated and the valves diseased," and the intestinal villi and mesenteric lacteals were engorged with chyle and lymph. In Petters' case, in which there was stenosis of both auriculo-ventricular orifices, and dilatation of the right side of the heart, the lymph-glands of the right inguinal region were transformed into cysts, and the mucous surface of the small intestines was covered with lenticular eminences filled with a transparent fluid. In Rokitansky's case (No. 37, *N. O. Med. and Surg. Jour.*), a dilated and hypertrophied heart, with mitral insufficiency, was found in connection with dilatation of an extensive area of lymph-vessels, stasis of lymph and effusion of lymph and chyle into the pleural and peritoneal cavities. The venous teleangiectasis upon the thorax of Friedberg's patient (48), the nodes upon the left arm, and the venous network upon the anterior thoracic wall were observed

at birth. These, together with the dilatation of the cutaneous veins upon the inner side of the left arm, and the eruption which resembled hemorrhagic spots, which remained, point to a disturbance of the circulation. The grouping of these evidences about the left arm and left clavicular region suggested to Friedberg the hypothesis that the flow of blood in the "vena cava sinistra" had met with an obstruction which extended its influence over the adjacent portions of the lymphatic and venous systems. Fetzer believed the condition into which his patient sank, and the reddish color of the coagulum of the lymph which exuded from the ruptured vesicles during the existence of this condition, were attributable to the regurgitation of blood into the left innominate vein and its entrance into the thoracic duct, with which he supposed the diseased lymphatic vessels communicated. In Ormerod's case of chylous ascites (No. 40, *N. O. Med. and Surg. Jour.*, March, 1877), the left subclavian vein and its afferent vessels were clogged with a light-colored clot, which prevented the flow of the contents of the thoracic duct into the vein, leading to the effusion of chyle into the peritoneal cavity; and in Cayley's case (No. 39, *N. O. Med. and Sur. Jour.*, March, 1877) of rupture of the receptaculum chyli, the thoracic duct was obstructed at its entrance into the left subclavian vein by fibrinous vegetations. These observations establish the influence of the heart circulation on the movement of the chyle and lymph, and illustrate the agency of obstructive cardiac diseases in the production of lymph-varices. Independently of the other cases cited, the case of the new-born calf observed by Virchow, in which extensive and remote areæ of lymph-varices were discovered, adequately illustrates the causal influence of an impediment to the free exit of the contents of the thoracic duct, produced by a thrombus pendent from the opening of the external jugular vein. With this brief résumé of this important question, which the reader will find more elaborately discussed in the *N. O. Med. and Sur. Jour.* (see Nos. for Sept. and Oct., 1877), I will proceed with the presentation of other forms of lymph-varices.

Case LXX.[1]—A child, two years old, had from birth a thick tongue,

[1] Virchow, Archiv für Pathol. Anat. und Physiolog. und klinische Med., vol. vii., p. 126. 1854.

which had greatly increased during the preceding two weeks. The tongue protruded from the mouth in a broad, thick, hard mass, and was closely encircled by the stretched lips. From two punctures made in the under surface a small quantity of blood was evacuated, but a tumor, situated below the right inferior maxilla, furnished several tablespoonfuls of a lymph-like fluid. Subsequently a portion was removed, measuring one and one-half inches in length, one and three-quarter inches in width, and three-quarters of an inch in thickness. Across the dorsum of this part extended a thick epithelial covering, removable in flakes. A few of the papillæ retained their filiform appearance; the most of them appeared thicker and coarser. Towards the point of the tongue they were as usual, but flattened upon the edges. Upon the posterior under surface lay, in partly bead-like rows, bluish, transparent vesicles, varying from very fine, just visible bodies, to the size of large flax seeds.

Upon section a pale, peculiarly cavernous tissue appeared, which differed from the appearance of ordinary cavernous tumors by the contents of the inter-trabecular caverns, in which was found a clear, yellowish fluid, here and there somewhat turbid, in other places coagulated into clear, transparent masses. The evacuated fluid coagulated upon exposure to the air, and contained albumen.

Upon longitudinal section through one lateral half of the ablated portion the cavernous tissue was found principally in the middle part corresponding to the region of the transverse muscle, as shown in Fig. 40.

Fig 40.

Upon the top could be distinguished the whitish, tough layer of the mucous membrane and the papillæ; below it a longitudinally striated, very tough, and whitish layer; next, the cavernous mass, and below again a more longitudinally striated layer, which continued be-

yond the apex. The same result was found upon transverse section, and the cavernous structure appeared in the centre in very coarse meshes, whilst towards the lateral portions it became fine, and towards the periphery the mesh-cavities became smaller and smaller in such a manner that bead-like vesicles could be traced up to the papillæ. The cavities were elongated perpendicularly, and varied in size from the smallest, barely visible points, to over one line in their greatest diameter. The width of the trabeculæ varied. Many of the cavities communicated by narrow openings; many, however, appeared closed, and the adjacent vesicles could be seen shining through at the bottom; the trabeculæ and partition walls which bound them were sharply defined, more or less smooth, and pale. See Fig. 41.

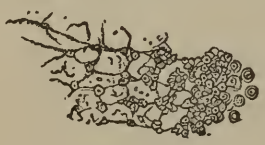


FIG. 41.

The smooth, regular walls, the bead-like course, the albuminous and fibrinogenous contents, the simultaneous disease of the gland below the inferior maxilla, from which the lymphatic fluid was discharged several times, the relatively rapid development of the large tumor, the complete freedom from pain, and the absence of any considerable hyperæmia, induced Virchow to ascribe the cavernous structure to the passive development of pre-existing lymph-vessels, in which an accumulation of fluid had taken place.

"Wherever the mesh-cavities contained coagulum it consisted of fibrinous threads united in a net-like manner, in which was enclosed numerous round cells of the size, form, and character of lymph-corpuscles. They were slightly nucleated, and contained single or multiple nuclei, which became more distinct by acetic acid." Virchow failed to demonstrate the wall-elements of lymph-vessels, but occasionally found traces of epithelium. The connective-tissue stroma contained numerous granular formations and cell-forms, which were especially abundant in the basic stroma of the papillæ. In the interior of the cavernous layer—as in the peripheral layers—he found the connective-tissue corpuscles in close proximity to other stellate cells, containing two or more nuclei, and as the interstitial tissue decreased the stellate bodies grew broader and larger, becoming arranged in rows and finally collecting in dark groups, as shown in Fig. 42. These observations led him to the conclusion that the cystoid cavities resulted from the pro-

gressive development of the connective-tissue corpuscles, and that in the above case the lymph-vessels and connective-tissue corpuscles were simultaneously involved. These conclusions he subsequently verified by examining the part of the tongue removed by Casper von Seibold, in 1791, and which had been perfectly preserved in alcohol. "The tongue belonged to a girl aged 12, had been unusually thick at birth, and grown slowly to such a size that it finally protruded beyond the edge of the teeth four and a half inches, was six inches wide, and two-thirds of an inch thick." The removed portion was covered with enlarged papillæ and interspersed throughout its structure with numerous rounded and oblong cavities.

Fig. 42.

Billroth[1] concludes from his examinations of several specimens from the excised portions of congenital macrochilia,[2] that the affection is analogous to macroglossia, and insists that the respective tumor formations occur in two forms essentially different externally; that is, they are either "connective tissue new formations between the muscular fasciculi, or cavernous cystoid degenerations, where the caverns contain a lymphoid fluid—a tumor formation, which, in contradistinction to cavernous blood-tumors, can be distinguished as cavernous lymph-tumors. Both forms can combine with one another, which may be the more easily comprehended, as both owe their existence to a proliferation of connective-tissue cells, whose eventual further development into fibrous connective-tissue, or transformation of their corpuscular elements into a homogeneous fluid determines the external difference of both forms of tumors."

He maintains that the condition of the tongue in the cases reported by Wagner, O. Weber and Volkmann, was due to the enormous new formation of connective tissue between the muscles. In Langenbeck's cases of macrochilia, the excised portions showed hypertrophic development of connective tissue and considerable enlargement of the glands of the lip, but the congenitally thickened lip had no independent growth. The following case of congenital macrochilia was observed by Billroth in Langenbeck's clinic.

[1] Beiträge zur Pathologische Histologie, p. 215.

[2] Cases of Wagner and Langenbeck.

Case LXXI.—C. R., aged fifteen, was born with a thick upper lip. He often suffered with swelling of the glands of the neck during childhood, without suppuration ever taking place, and several times the upper lip had been inflamed and much swollen, which had subsided, leaving only an increased enlargement of the lip. At the time of the observation (1859), the boy appeared well nourished; the upper lip protruded beyond the lower, and was far beyond its normal size. The buccal mucous membrane turned outward, was corroded, bled easily; color dark-red. The tumor felt tensely elastic, not fluctuating, was not painful, and could not be diminished by pressure.

The excised portion collapsed very much, and showed to the naked eye a distinct cavernous trabecular tissue, and a lymphoid serous fluid could be pressed from the deeper caverns, while coagula were found in the smaller caverns. The trabeculæ were formed in part of connective tissue only, in part also by fibres of the orbicularis oris; the largest cavities were of the size of small peas, the smallest microscopic. Microscopic examination showed that the trabeculæ consisted mostly of inelastic connective-tissue fibres, mixed with many elastic fibres; in some of them lay also many striped muscular fibres in larger or smaller microscopic bundles, especially in the periphery; blood-vessels were recognized in many trabeculæ, especially small arteries. A single layer of small spindle-shaped cells surrounded most of the finer trabeculæ in the manner of vascular epithelium. The serous fluid found in the meshes presented only small cells in a fluid containing albumen and mucin, which were so like lymph-corpuscles, that they could not be distinguished from them; similar cells were also found in the white coagula of the smallest meshes.

Case LXXII.[1]—E. S., aged seven months, suffered from congenital macroglossia, which about every four weeks was attacked with some inflammation, attended with difficult deglutition, dyspnœa and considerable enlargement of the neighboring lymphatic glands. The volume of the tongue was increased after each attack, finally attaining the size of an ordinary apple, felt very tense to the touch; was dark-red; its surface was covered with a thick, white coating. The strongly developed papillæ gave to the surface a thickly villous, furry appearance.

The protruding portion was amputated, and on examination its parenchyma was found to have degenerated into a cavernous meshwork, whose trabeculæ were partly formed of white, firm connective-tissue cords, partly by muscle bundles. The fluid within the meshes of the cavernous tissue coagulated into very white coagula, which looked like fibrin coagula and consisted of lymph-corpuscles.

The examination of these specimens led Billroth to the conclusion that the caverns were in connection with the lymphatic system, which was corroborated by the clinical histories of the

[1] Billroth, loc. cit.

cases. He failed to demonstrate any direct communications between the caverns and lymph vascular system, and examined the transition portions from the healthy to the diseased tissue, with special reference to this point, with the following result:

"The source of development was in the connective-tissue cells, whose nuclei divided and gave rise to the cell-agglomerations found in the connective tissue as well as between the muscle-bundles. The cells which could be isolated formed the starting-point of the disease; the rapidly increasing cells produced either a firm connective-tissue substance, resulting in the fibroid form of tongue or lip hypertrophy, or the intercellular substance produced by the cells was fluid, and the cavernous form was the result—both may be combined, as was the case in the tongue, where a partly fibrous[1] and partly cystoid tissue was developed."

Billroth coincides with Virchow, that in such conditions as were found in cases 71 and 72, a cavernous ectasia of lymph-vessels was the primary and predominant condition, but he differs from Virchow in the opinion that all cases of congenital macroglossia and macrochilia find their cause in ectasia of lymph-vessels and spaces, and holds that in some cases the hypertrophy was solely a fibroid development. From these views Weber[2] dissents, and maintains that it is an hypertrophy of the muscular tissue, having its beginning in an exudation of plastic material as the result of some obscure inflammatory process.

Case LXXIII.[3]—A young girl, 10 years of age. For a year and a half the parents noticed that the nose increased in size towards the root and lateral parts; the tumefaction extended by degrees to the two inferior eyelids and towards the inter-superciliary space; it increased gradually while remaining circumscribed in these regions. The tumor was punctured, but in two days was reproduced to the

[1] Billroth asserts that cavernous lymph-tumors, like cavernous blood-tumors, may sometimes combine with fibroid and lipoma formations, and cites the case of a tumor extirpated by Langenbeck, in which the mesh-cavities contained a fluid, which under the microscope looked like lymph, and in which the fibroid and lipomatous formations were found. He also observed in a tumor of the lobe of the ear of bean size, that a third of it consisted of cavernous tissue with lymphoid fluid, whilst the other two-thirds presented the structure of fibroma.

[2] Archiv f. Patholog. Anat. und Physiolog.. vol. vii., 1854.

[3] M. N. Dalbanne, eleve du service of M. Prof. Broca. Le Courrier Medical, No. 50, Dec. 12, 1874, p. 394.

same size as before. Subsequently she was committed to the care of M. Broca. At this time both lower eyelids were much enlarged, soft, giving a false sensation of fluctuation as in lipoma, and simulated two voluminous pads which encroached upon the eyeballs, partially covering them and elevating the upper lids. The base of the nose and the lower part of the forehead participated in the tumefaction, which effaced above the level of the frontal protuberances, and which descended on either side to the convex borders of the cartilage of the nares. The facial mask presented a peculiar aspect; on the two sides, the swelling had produced a sort of levelling; the deep depression which separates the bridge of the nose from the prominence of the malar bones was partially filled up; the inferior angles of the eye were raised. The skin of the eyelids was slightly bluish; that of the forehead and nose was pale and shining. The thinned skin could be raised. The tumor could be but slightly diminished by pressure, but the contents flowed from one part to another. Broca punctured the tumor on the left eyelid and the entire tumor disappeared, proving a communication between the pouches. The fluid discharged was pale yellow, and exhibited, on microscopic examination, red globules, some normal, others crenated and deformed; no globulins nor fat granules. It coagulated on exposure to the air, the coagulum was slightly red and contained red and white corpuscles. The serum was alkaline. Broca concluded that the case was one of lymphatic angioma.

Broca regarded the lesions in this case as closely comparable, if not identical, with those presented in the case of macroglossia reported by Virchow. In the latter case the lacunæ varied from points scarcely perceptible to cavities measuring more than a line; many of the cavities communicated by minute openings in their intervening septa. According to Virchow the cavernous structure depended on the simultaneous dilatation of the lymphatic vessels and of the plasmatic channels in communication with them. Sappey rejects any hypothesis involving distention of the serous canaliculi of the connective tissue, but admits the ectasy of the vessels. Broca suggests that the cavernous condition may be produced by the dilatation of lymphatic vessels, which "elongate themselves, become tortuous, return upon themselves in the form of clusters comparable to little bladders united to each other," and by the thinning and rupture of their walls become transformed into lacunæ. Some of these lymphatic varices undergo a polycystic transformation, which some have attributed to obliteration of the vessel, but Sappey denies this and insists that the ectasy is due to a primary lesion of the walls of the vessels, which dimin-

ishes resistance and elasticity, and which "depends on a general influence as unknown as that which presides over the formation of venous tumors."

Virchow insists that the "bead-like, bluish, transparent vesicles, which varied in size from just visible bodies to the size of hempseed," found on the under surface of the ablated portion of the tongue, were dilated terminal lymph-spaces, and communicated by very fine apertures with deeper-seated vessels, or with the cavities of the cavernous tissue of the parenchyma. For, notwithstanding this connection could not be demonstrated, it could be shown that the cystoid spaces, probably dilated lymph canaliculi, became smaller and smaller towards the surface, and, finally, bead-like vesicles could be traced up to the papillæ. The characteristics of the cavities with which the hypertrophied portion were interspersed, can only be explained upon the supposition of the primary ectasia of lymph-channels. Their smooth, regular walls, bead-like course, the albuminous contents, and the simultaneous enlargement of a neighboring gland, from which lymph was discharged, point to a passive dilatation of lymph-channels. In one of Billroth's cases, cavernous trabecular tissue was distinctly visible to the naked eye, from which a lymphoid fluid could be pressed, and, in the other case, he found a cavernous transformation of the parenchyma containing a lymphoid fluid. Neither Billroth nor Virchow succeeded in establishing a direct continuity between the caverns and lymph-capillaries, but the microscopic character of the fluid was sufficient. In one of Billroth's cases it was not possible to distinguish the fluid from lymph, and in the other it consisted of lymph-corpuscles and fibrin. Virchow maintains that the cystoid formations found in the nodes of congenital hypertrophies are formed by the dilatation of the lymph-spaces, though their communication with lymph-vessels may not be recognized. Billroth, though holding that congenital macroglossia and macrochilia may be either solid or cystic, concedes that the cysts owe their origin to occlusion and dilatation of lymph-channels; and O. Weber[1] asserts that congenital lymphangiectasiæ of the tongue and lip find their cause in dilatation of the final terminations, or, more correctly, of the origin of the lymph-vessels.

[1] Billroth and Pitha, Surgery, vol. vii., 2d div., 1st part, p. 72.

"In a clinical aspect," says Billroth, "the connection of cavernous degeneration of the tongue and lip with disease of the lymphatic system is highly probable, especially in connection with a scrofulous diathesis." In both cases detailed by him, "rather considerable tumefaction of the submaxillary glands existed simultaneously with the affection of the tongue and lip, especially in the acute attacks, which, he suggests, may be traced to lymph thrombosis taking place in the cavernous spaces." In this connection I append the case of "elephantiasis dependent on the scrofulous habit," reported by Hufeland.[1]

Case LXXIV.[2]—A boy, aged fifteen, had a congenital tumor of the upper lip, which protruded beyond the lower lip in the form of a hemisphere; was painless, could not be compressed, not fluctuating, and tensely elastic. It was frequently attacked by acute inflammation, and bled easily. After its excision, it presented, even to the naked eye, a cavernous trabecular tissue, whose mesh-cavities contained partly coagulum, partly serous fluid. The trabeculæ consisted of connective tissue which contained many elastic fibres and blood-vessels; they were invested by epithelium. The fluid contained small cells like lymph-corpuscles.

Case LXXV.[3]—Adolph A., æt. two months. In the dorsal decubitus of the patient, the entire right half of the thorax and lumbar

[1] A girl with a scrofulous constitution having had in infancy discharges from the ears, ulcerated eyelids, and all the symptoms of a scrofulous diathesis, was seized with small-pox in her eleventh year. She continued in good health for two years; but in the course of her thirteenth year a swelling commenced on her left foot, which extended to the calf. This disappeared, but subsequently returned and extended throughout the entire limb, the left foot growing to twice the size of the right, was cool, pale, and so hard that the fingers could make no impression on it. Subsequently, a vesicle appeared on the inside of the left knee, from which a yellowish serous fluid was discharged. The vesicle healed, but reappeared, and the matter discharged this time resembled coagulated milk, and was so acrid as to inflame all the neighboring parts. The foot continued to swell and grow harder, until it felt in some places like leather. She had at varying intervals violent attacks of delirium, oppression, and congestion of the brain, beginning with the approach of the catamenia. The leg continued to grow, became overspread with a red color mixed with a bluish tint. A small, shining, very tense spot appeared on the calf. This and the vesicle ulcerated and discharged fetid pus. Nevertheless, the limb continued to grow, became monstrous in size, and scirrhous throughout; glandular swellings appeared in various parts, which inflamed and suppurated. Hectic set in, and death ensued.—A Treatise on Scrofulous Disease, Translated by C. D. Meigs, M.D., Philadelphia, 1829, p. 212.

[2] Lücke. Billroth and Pitha, Surgery, vol. ii., div. 1, part 2d, p. 268.

[3] Hofmokl, Langenbeck's Archiv, vol. xii., p. 685.

region was occupied by a tumor which extended upwards to the axilla, downwards to the crista ilii, inwards to within one inch of the sternum, and backwards to the transverse processes of the vertebræ. The covering integument was traversed by small dilated veins, and presented several bluish elastic places. Upon the external side of the tumor was a venous teleangiectasis one and one-half inches long by one wide. The surface of the tumor was hilly, and in one place the skin was retracted in an umbilicus-like manner. It was elastic, fluctuated at most prominent part, could be diminished somewhat by pressure, and became full and tense during the crying of the child. Nothing abnormal in the thoracic or abdominal organs. At its upper part it was somewhat transparent. The tumor collapsed after evacuation of the fluid, and seemed to consist of caverns which communicated one with another by numerous canals. The fluid was alkaline, coagulated spontaneously. Microscopically a small number of lymph-cells could be demonstrated. 100 grammes of the fluid contained: serum albumen, 2.385; fibrin, 6.085 gr.; globulin in small quantity, and salts of the blood serum. No lymph-vessel epithelium could be discovered.

Case LXXVI.[1]—A.W., æt. one year and five months, had a congenital tumor of the size of a pigeon's egg, of hard consistency, situated to the left of the perineum in the immediate vicinity of the scrotum. At the time of the observation the tumor had grown to the size of an infant's head, and extended from the scrotum attached to the left of the perineum, to behind the anus, sending the principal mass towards the left tuber ischii, and looked like a third buttock. The primary portion had grown but little and felt hardish, whilst the new growth felt more like a lipoma or cavernous growth, and formed the principal part of the mass. The child was otherwise healthy, ate, drank, and possessed all the normal functions.

Microscopic examination of the ablated portion by Professor Waldeyer. It consisted, for the greatest part, of normal cutis, with subjacent, perhaps inch thick, fat connective-tissue cushions. The fat clusters, however, were but little developed; the interstitial connective tissue was more prominent and formed in spots tolerably firm, but always elastic, yielding masses. In the place of the fat cushions, single, mostly pea-size, clear cysts, with thin walls, were seen lying in the connective-tissue meshes. In the larger integumentary portions one of the cysts attained nearly the size of a walnut. The smallest looked like beads, clear as water and of pin's-head size.

A piercing injection filled several of the larger and smaller cystic cavities, so that a communication existed between them as well as with the lymphatic lacunæ in the connective tissue. Upon section, a perfectly clear, slightly adhesive fluid of weakly alkaline reaction was evacuated, which coagulated spontaneously into a beautiful, consistent jelly. The microscope showed, besides isolated red blood-disks and a small quantity of finely granular coagulum, only amœboid corpuscles in moderate quantity, of the character of ordinary

[1] Reichel, Virch. Arch., vol. lxiv., p. 497, 1869.

lymph-corpuscles throughout. The cysts, even to the smaller ones, were composed of intercommunicating compartments. Their walls consisted of fibrillar connective tissue, upon the interior surface of which could be demonstrated the contours of beautiful lymphatic endothelium.

In the more compact connective-tissue accumulations were found, after hardening in alcohol, smaller, irregularly formed cystic cavities, and larger cleft-like lacunæ, which were filled with granular coagulum and lymphatic cells, such as were obtained from the larger cysts in the recent state. Prof. Waldeyer classed the case among lymph-angiomata.

Case LXXVII.[1]—A female, aged nineteen. At the age of nine, while playing, was suddenly attacked with severe pain in the left groin, attended with redness and accompanied with vomiting and chilliness. These attacks recurred thrice a year until four years ago, when a number of small vesicles formed upon the inner side of the thigh, which ruptured spontaneously and have continued to discharge a clear fluid. At the present time (July, 1869), a tumor, about the size of a fist, indistinctly defined and perfectly soft, is situated upon the inner side of the left thigh, below Poupart's ligament. The covering integument is traversed by several dilated vessels supplied with several openings, from which a fluid can be expressed, which coagulates into transparent, pale jelly. Instead of a cold abscess Prof. Billroth found a cavity of fine mesh-work from which the fluid exuded, which proved to be of a lymphatic character, as shown by the following analysis:

Reaction, alkaline; sediment, large, consisting of fibrin. The fluid, in its principal bulk, consisted of albuminates, among which were serum-albumen, fibrin and caseine. The sediment contained fibrin coagula, in which were found numerous colorless blood-corpuscles, a few red blood-corpuscles, some tissue débris, consisting of connective tissue and pavement epithelium.

Quantitative analysis: specific gravity, 1.017; water, 978; ashes, 8.125; fibrin, 1.000; globulin, 1.204; serum-albumen, 5.494; caseine, 5.518; phosphoric acid, 0.200; lime, 0.252; chloride of sodium, 2.245; and sulphuric acid, 1.034.

Microscopic examination of the extirpated tumor by Czerny.

The principal bulk of the tumor consisted of connective-tissue rabecular mesh-work, which contained lymph in its interstices. The walls of the lymph-caverns were lined by endothelium. Here and there, especially in the periphery, the connective tissue was richly infiltrated with cells, and columns of young cells passed into the surrounding tissue, which were connected with lymph vessels. The tumor seemed to owe its origin to the development of granulation tissue around the lymph-vessels, which, by cicatrization produced ectasia of the vessels, and thus led to the formation of a cavernous lymph-tumor.[2]

[1] Gjorgjewic, Arch. f. klinisch. Chir., Langenbeck, Bd. xii., p. 646, 1870.

[2] The congenital character of this case is doubtful. The manner of its development is so nearly identical with the case of Demarquay (No. 50), that I have felt compelled to introduce it.

Case LXXVIII.[1]—R. Z., æt. 22. During his fourth year began to grow thin without assignable cause, and then his mother noticed a small, painless node upon the right side of the chest and a small protuberance upon his forehead. These were followed by numerous similar growths upon different parts of the body, but the chest tumor distinguished itself by its continued growth, so that in 1864 it measured in length thirty-five centims., and hung in a pouch-like manner from the third rib to a line drawn horizontally outward from the umbilicus. At its places of attachment, which extended from the axilla to the middle of the sternum, its circumference was thirty-four centims., and thence from above downwards, flattening a little, reaching a thickness of fifteen to twenty centims. (See Fig. 43.) Its surface was covered with secondary nodes, from cherry to apple size, which lay closely together, and were distinguished from the dirty, corrugated and scarred skin by a reddish, pale color; the skin was traversed by abundant venous networks, and along the convex edge was covered by bran-like scales. The entire sac felt strong and elastic to the touch, could be lengthened by traction, and could be thrown over the shoulders. No nipple could be discovered. Besides this tumor the trunk and extremities were abundantly covered with larger and smaller growths. Three were situated upon the head; one as large as a pigeon's egg occupied the centre of the forehead; two, each the size of hen's eggs, were situated symmetrically, one upon each mastoid process. The entire back was sown with smaller nodules, and two were found on each side of the linea alba. All these nodes had a smooth surface, were of soft consistency and of lighter color than the surrounding dirty brown skin. The tumor weighed after extirpation three and a half pounds, and presented upon the dry, pale brown cautery surface a firmly meshed tissue. The cortical layer, of an average thickness of three centims., consisted of round juicy nodes, of the average size of a cherry and of a yellowish color, and were inclosed by a strong, firmly-fibred interstitial substance in which the vessels and numerous cystic cavities of from millet to lentil size were found, from which a clear albuminoid fluid was discharged. Microscopic examination revealed cutis papillæ, more broad than high, a relatively thin, brown rete-Malpighi, with superficial, sparse, horny epidermis cells. The sebaceous glands appeared at places to have degenerated into lentil-sized sacs filled with fat granules and closed toward the integumentary surface. The deep nodules of the cortex of the tumor were composed of aggregations of round or oval,

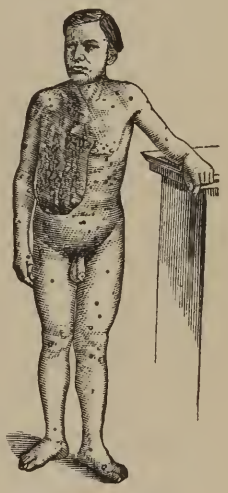


Fig. 43.

[1] Bryk, Oester. Zeitschr. für pract. Heilkunde, vol. xv., No. 41, p. 141.

mostly multinuclear cells of the size of pus-corpuscles; the superficial, however, were composed of nets of anastomosing nuclear connective-tissue cells, whose branches bounded very small and regular mesh-cavities, and uniting with the fibre-layers of the interstitial substance inclosing them in a ring form, presented an areolar appearance. The fibre-trabeculæ found between the latter consisted principally of elastic tissue. The lymph-vessels formed nets with wide, oval mesh-cavities. Their diameter varied from 0.03 to 0.05 mm. In such regions as were rich in lymph-vessels round or oval parenchyma-lacunæ were seen, which, like the microscopically cystoid cavities, were lymph-vessels. The central portion differed from the peripheral layer by a firmer texture and a strikingly brown-red color. A strong, fibrous trabecular network, which passed from above downwards, corresponding to the longitudinal diameter of the tumor, received numerous dense connective-tissue nodes. Small fat lobules were scattered here and there, associated with a wealth of vessels, especially veins, so that the tumor acquired a teleangiectatic appearance. The entire tumor, adds Prof. Bryk, presented a congenital character.

Case LXXIX.[1]—S. K., aged 50, had had from her earliest recollection a bean-like prominence upon the left labium majus. Observed after the menses had ceased for two years, that it enlarged, became pediculated and began to develop into a globular tumor, which hung between the thighs. Inguinal glands of left side swollen and painful; and upon palpation a diffuse, painful induration was felt in the left side of the pelvis. In consequence of a superficial ulceration a sero-purulent fluid had been discharging for several months from the tumor.

The tumor, after removal, measured twenty-eight centims. in circumference. The bronzed-colored surface of the movable, hairless skin was smooth. Upon section a large quantity of serous fluid exuded, which coagulated spontaneously. White connective-tissue strands traversed the tumor in every direction, and gave it a finely lobulated construction, which was interrupted by numerous cysts, varying in size from a millet-seed to that of a bean. Upon microscopic examination a cutis tissue could be demonstrated upon the most depending portions, the papillæ of which, more broad than high, were supplied with capillary vessels with thickened walls. In all other parts the boundary between the cutis and the bulk of the tumor was obliterated, and the latter consisted of a finely-meshed network of spindle-cells which were crossed in all directions by elastic fibres and undulatory connective-tissue strands, between which, in many places, conglomerations of nucleated cells were imbedded, which were in a state of fatty degeneration. The lymph-vessels were very abundant, and in connection with the elastic and connective-tissue fibres, formed the principal part of the tumor. The bead-like, dilated larger branches showed thickened walls covered by layers of fine spindle-cells divided in the vicinity of the cysts into varicose networks with wide meshes, and here and there attained a diameter which corresponded to the lumen of the

[1] Prof. Bryk, loc. cit., p. 249.

cystoid cavities. They were lined by a delicate epithelium of small, round nucleated cells. Towards the periphery they gradually became smaller and smaller. Fat-cells were found only in the most dependent part of the tumor immediately beneath the corium in the form of isolated vesicles, and smaller than the cells of the normal panniculus adiposus.

Case LXXX.[1]—H. K., æt. 14 months, was born with a cherry-like, flat node, situated upon the mons veneris, a little to the right, which began to increase very rapidly soon after birth, and at the age of one year and six months had attained the size and form of a bunch of grapes, as represented in Fig. 44, was movable in all directions, and rose from the integument of the mons by a short pedicle, which became distinct upon traction downwards and during the erect position

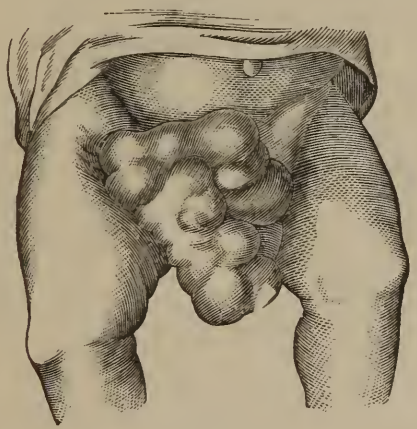


Fig. 44.

of the child; it arched over the right inguinal region, covering the external genitalia, and descending in an oblique manner from above and the right side to below and to the left, between the thighs down to the knee-joint, with a vertical diameter of thirty centimetres; its circumference at the pedicle was twenty centimetres; at its base in the height of the inguinal fold thirty-eight centimetres. Upon elevating the tumor it was discovered to have intimately grown with the labia majora, but the nymphæ and clitoris were normal. The skin was traversed by numerous venous nets, could only be lifted up in a fold in the region of the pedicle and at the upper portion of the tumor, at other places it was firmly attached. Upon its surface rose larger and smaller nodes of soft consistency, disappearing under pressure, when a deep-seated annular constriction could be distinctly recognized as boundaries between the single protuberances.

[1] Prof. Bryk, loc. cit., p. 208.

After the extirpation of the tumor, one and a half pounds in weight, a large quantity of serum-like fluid, which coagulated spontaneously, was discharged, after which the nodes collapsed, and only a loose, firmly meshed connective tissue remained, which was permeated by white tendinous strands in various directions. Vascularity was not considerable, only two small arteries had to be ligated; the veins were more numerous, and several were varicose. Upon microscopic examination a network of anastomosing connective-tissue cells, with regular mesh-cavities were found in the places of the soft, fluctuating nodes, surrounded by elastic fibre strands, be-

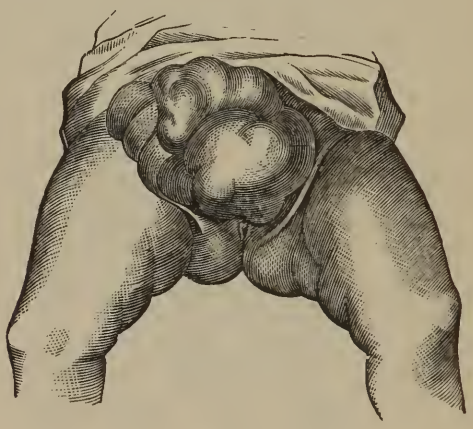


Fig. 45.

tween which capillaries with thickened walls and lymph-vessels were imbedded. Fat-cells were exceedingly rare in the form of single lobules at the base of the tumor. Fig. 45 represents another view of the growth.

Prof. Bryk concludes the report of the last case with a reference to a plaster cast in the collection of the surgical clinic at Cracow, of a case observed in a woman 30 years old, in which a "pale red prominence found at birth in the vicinity of the mons veneris, which gradually bulged forward to the size of an apple," and at the appearance of the catamenia began to grow rapidly, had at the time of the observation "extended downwards between the knees and terminated in a rounded, melon-shaped intumescence," which measured forty-four centimetres in circumference. During the progress of the growth "little vesicles appeared at every menstrual period upon the surface of the

tumor, which ruptured spontaneously and discharged a milky fluid. Each vesicular eruption was followed by increase of the volume of the tumor." Prof. Bryk invites special attention to the difference in the progress of development which characterized the tumors in case 79 and in the case just referred to, and insists that such growths are usually interrupted in their development, and, in the congenital forms, their course is very slow until the catamenia are established, when with every recurring menstrual period the volume of the tumor is greatly augmented. In case 80 the increasing growth seems to have been coincident with birth, and this, Prof. B. claims, constitutes its exceptional character. Others have observed the apparent connection between the menstrual recurrences and increased development of lymphatic tumors, but it is not an invariable rule. In case 79 the bean-like prominence which had existed from birth upon the left labium majus did not begin to increase until two years after the menopause. The following case reported by Dr. James R. Chadwick, of Boston, exhibited a marked connection between the development of the lymphangioma and the periodic discharges.

Case LXXXI.[1]—Miss L., aged thirty-two, had suffered for six years with hystero-epileptic convulsions, which were supposed to be due to the presence of a tumor "at the vulva, first observed about the time the convulsions began," and which at the time of the examination was "as large as a walnut," oval and elastic, and "lying precisely beneath the arch of the pubis, between the anterior vaginal wall and the urethra, and projecting into the vaginal canal, so as to occlude the opening into the hymen." The tumor had increased with every menstrual period. During the catamenial period preceding its removal, "it had swelled to unwonted dimensions, had protruded from the vulva, whereupon she had picked off two scales from its surface. The tumor had since remained large, protruding, and at the two spots mentioned the tissues had budded out."

The tumor, about as large as a hen's egg, was "found[2] to be exceedingly rich in delicate vessels, not containing blood, anastomosing one with the other in a very intimate manner; the intervening spaces were more or less circular, and contained a fibrillated substance in which were occasional round and innumerable stellate cells. The latter were, in many instances, directly continuous with the vessels previously described, particularly with the smaller ones, which were likewise stellate in their distribution, and apparently differed from

[1] Phil. Med. Times, Sept., 1875, p. 801.

[2] Microscopic examination by Dr. R. H. Fitz.

the stellate corpuscles only in being more voluminous and having more abundantly nucleated walls." The anastomosing tubes presented the characteristics of lymph-vessels.[1]

In this connection the cases of lymphatic tumors[2] involving the absorbent vessels of the breast, become interesting. They are usually found in the "breast of females between the ages of fifteen and thirty-five, and are liable to recur frequently, where there exists comparative emaciation, accompanied with irregular or deficient menstruation, depression of spirits and general debility, and, hence, most frequently occur in suckling and sclerotic women, and are always associated with deficient circulation in the womb, manifested by the discharge of an imperfect secretion, or false membrane from its mucous surface."[3] This relation of the menses to tumor developments is more distinctly exhibited in the succeeding case.

[1] Vaginal fibromata have been quite frequently observed, a few of which were congenital, but only in a few instances were microscopic examinations made. It is probable, as suggested by Dr. Chadwick, that some of them may have been lymphangioma. See for references the papers by Drs. Bryk and Chadwick, previously referred to.

[2] "These tumors are characterized by a painful, tender, and irritable swelling, varying in size and consisting of several cord-like, indurations, at times disposed in parallel rows, or connected after the manner of an anastomosis. The swelling is always transverse, following the direction of the absorbents towards the axilla, and consists of lymphatic vessels with thickened coats, imbedded in a stratum of condensed cellular tissue. The glands in the axilla, and, more rarely, those below the clavicle, become enlarged. Among the cases reported by Dr. Coley was one, in which the tumor was as large as a walnut, irregular on its surface, tender and painful on pressure, and situated in the upper part of the breast along the course of the absorbents. Every three or four weeks the uterus discharged a kind of false membrane instead of the proper menstrual secretion. The nipple was retracted; bowels relaxed. These tumors are to be distinguished from the chronic mammary tumors described by Sir Astley Cooper, and from the irritable tumor."—James Milman Coley, M.D., London Lancet, vol. i., 1843, p. 579.

[3] Milk secreted from the axilla.—M.S., æt 37. A swelling nearly the size of half a walnut was first observed in the right axilla, the night of her seventh confinement, and continued the same for a month, when it became painful and began to discharge a small quantity of a milky-looking fluid. A month later it had somewhat a doughy feel, was compressible, the covering integument was normal. On pressure a small quantity of milky fluid was discharged, which on microscopic examination presented all the characters of true milk, and seemed to have been secreted from a portion of the mammary gland situated in the axilla. Six months after the first observation the swelling presented the appearances and character as previously described, and the discharge of milk continued.

Hare, Trans. Patholog. Soc., London, vol. xi., p. 304, 1860.

A case somewhat similar is recorded in Dic. des Sci. Medicales, t. xxx., p. 397.

Case LXXXII.[1]—Rosina Geng, æt. 32, was of medium height, well proportioned, well nourished, never seriously ill, though of weakly constitution. At the age of 19 was compelled to abandon "service" because of a tumor of the external genitalia, from which after puncture a watery fluid was discharged. She menstruated regularly up to her 25th year, and gave birth to a healthy child in her 26th year. After the lying-in menstruation ceased entirely and the skin of the back began to thicken. The tumor grew rapidly, and in eighteen months had attained the size, when first seen by Hecker, as represented in Fig. 46.

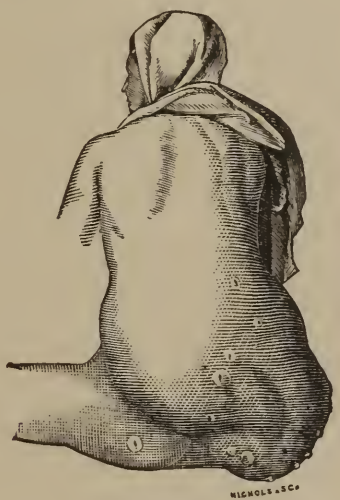


Fig. 46.

The integument was flaccid, dirt fallow, yellowish, and especially from the occiput to the pedicle of the largest tumor much thickened, grayish and traversed by white lines and somewhat excavated spots, like the abdomen of women who had given birth to children, but was movable and could be elevated into large folds. Upon the skin in many places were sixty smaller and larger tumors, many about the size of a cherry, comparable to lipoma angiectodes; others compact like fat tumors; others soft, fluctuating, and containing a serous fluid. The integument of the solid tumor was thickened, but of normal color; that of the others was thinner, of a bluish color. A large, movable soft tumor was located upon the neck; another, of apple size, upon left buttock. The largest one commenced at the seventh cervical vertebra and from both scapulæ, with a pedicle sixteen inches in diameter, which extended down to the first lumbar vertebra, occupying the entire back and drawing up the skin of the anterior and lateral por-

[1] Carl W. Hecker. Die Elephantiasis. 1858.

tions of the trunk.[1] It hung over the buttocks, measured longitudinally 2 ft. 2 in. at its base, in circumference 2 ft. 8 in., and just above its lowest portion 3 ft. 4 in. in circumference. After amputation it weighed 31 lbs. The greater part of the tumor felt like a lipoma, but in a few places was soft and fluctuating. The integument was traversed by few vessels, but strongly pigmented, somewhat reddened during fever, and upon its surface were cysts of pea size, and soft tumors filled with serum, like those situated upon other parts. From cracks and fissures a sickening, light yellow fluid dribbles at certain periods, which after standing separates into a thin, lighter, and thick, viscid, gelatinous portion. The quantity usually amounts to four or five pints in twenty-four hours; recurs every four or five weeks, lasting usually four or six days, and is accompanied with fever, lassitude, soreness in the limbs, nausea and vomiting, palpitation, dyspnœa and general malaise. A sound introduced through an opening entered a lardaceous mass supplied with caverns, from which was discharged a fluid rich in albumen, with the addition of several salts, especially chloride of sodium. Towards the lower end the tumor was divided by a deep furrow into a smaller left and a larger lower right half.

Pathologico-anatomical examination of the tumor.[2] It lost by drainage, after amputation, of a serous, albuminous fluid several pounds. The microscope showed it to consist of hypertrophic connective tissue, the interstices of which were filled with serum and a firm, white, lardaceous mass. The skin was in some places an inch thick; only a few fat-globules were found. It was very vascular and traversed by thirty-six dilated, elongated and tortuous veins, which did not collapse, but remained patulous and rose more or less over the cut surface. The arteries were dilated, elongated and tortuous, but their coats did not exhibit any textural changes. These vessels traversed the hypertrophic integumentary and cellular tissues in every direction. Beneath the latter the parts did not show the least structural change.

The foregoing examination does not prove the lymphatic nature of the tumor; but the presence of the numerous caverns formed by the greatly expanded connective tissue interstices

[1] The patient insisted that these tumors were present from her earliest recollection, as prominences of the color of the skin and not as spots.

[2] The brothers and sisters of Rosina Geng were healthy. Her parents had been long dead, but it was generally known that their maternal grandfather had upon his back and chest many tumors of about the size of a fist, and many wart-like excrescences upon other parts; that their father had in the later years of his life a large tumor on his left arm, which sometimes broke and discharged a stinking ichor. His brother had a tumor larger than Rosina Geng's upon his back, which hung far down over the buttocks, which rendered walking scarcely possible. This hereditary tendency has appeared in several instances, and is attributed by Hecker to a peculiar diathesis, which is transmitted to offspring.

filled with a fluid rich in albumen and salts, and the fat masses, go far towards establishing this conclusion. This view derives confirmation from the analogous conditions found in several of the cases previously introduced. In Lücke's case (74) the tumor on the upper lip presented in its interior organization a cavernous trabecular tissue, with meshes filled partly with a coagulum and partly "with a serous fluid containing small cells like lymph corpuscles;" in Reichel's case (76) of congenital "lymphangioma cavernosum cystisus," the hard perineal tumor, which felt like a lipoma, proved on microscopic examination to be a conglomeration of larger and smaller cystoid cavities, with interposed fat and connective tissue. Prof. Waldeyer found in the meshes of the connective tissue, "transparent cysts, communicating one with another and with the lymphatic lacunæ of the connective tissue." The fluid found in these cysts was weakly alkaline, perfectly clear, slightly adhesive, coagulated upon exposure, and contained isolated red blood-disks and a few ameboid corpuscles resembling lymph corpuscles. Upon the interior surface of the cysts lymphatic endothelium appeared in perfect outline; in Hofmoke's case (75) the tumor consisted of caverns communicating with each other by canals. The interstices of the connective tissue mesh-work, which constituted the bulk of the tumor in Gjorgjewic's case, were filled with lymph. The cases (78, 79, and 80) reported by Prof. Bryk also present analogous conditions, but in all these cases the lymphatic nature of the cavernous structures was unmistakable. The case of Hecker exhibits other interesting phenomena; an enormously thickened skin, due to hypertrophied connective tissue, co-existed with a very remarkable and abundant supply of veins, which were greatly dilated, elongated, and tortuous. This extraordinary development of the veins necessarily led to stasis of venous blood, and the fluid which filled to repletion the lymph spaces was probably derived, through transudation, from the venous plexus, and, consequently, represented a fluid poor in corpuscular elements, but comparatively rich in the constituents of blood-serum—hence the very marked proliferation of connective tissue. The "cysts of pea size and soft tumors filled with serum," which studded the surface of the large tumor, were manifestly ampullar formations in open continuity with the widely dilated lymph spaces. The gelatinous coagulum which

formed characterized the exudation as an impoverished lymphous fluid. The "lardaceous" infiltration was probably a degenerative process.

Case LXXXIII.[1]—Therese Geng, the bastard child of Rosina Geng, was born with a small tumor upon her back, which had grown to the size of a fist at the age of six. Never menstruated. From her fif-

Fig. 47.

teenth year the tumor grew rapidly. At the age of twenty-five she was small, well built, badly nourished, walked badly, and stooped towards the left side. The tumor, measuring 77 ctms. from base to

[1] Czerny, Archiv. für klinische Chirurgie, Vol. XVII., p. 357.

apex, extended from the last dorsal vertebra and hung like a bag below the popliteal space. A pear-shaped lobe, the size of a child's head, ulcerated at its lower end and discharged ichor, whilst another lobe, somewhat like a cock's comb, was prominent towards the right side. Circumference of the bag-like portion, 38 ctms. The external and anterior side of the right thigh was covered with flat, hemispherical tumors, varying in circumference from the size of a silver dollar to that of a fist. The cutis was firm and thick, loosely attached, but not discolored. See Fig. 47.

Fig. 48.

In 1871 Prof. Hecker ablated the pear-shaped portion, and when Prof. Czerny took charge of the clinic several months afterwards, the tumor presented the appearance as represented in Fig. 48. The

skin was sallow, yellowish, muscular tissue flaccid, subcutaneous tissue rather fatty. The remaining portion of the tumor had increased considerably, and did not present itself as a sac-like elongation of the skin, but was very firm. The skin was firmly adherent, darkly pigmented, somewhat retracted at the seat of the operation, and granulating. Upon the surface of the tumor were several fistulous canals, from which was discharged a thin serum, mixed with pus-flakes. The fluid, often secreted in large quantities, was clear, albuminous, contained lymph corpuscles, coagulated readily and spontaneously. Prof. Czerny made several ineffectual efforts to reduce the tumor. The patient died March, 1873.

Sectio cadaveris. Both pupils equally dilated, hypostatic discolorations upon the back. Towards the left of the median line from the 10th dorsal vertebra to 10 ctms. below the right trochanter, in a longitudinal extent of 45 ctms., the skin continued in a solid tumor, depending downwards. At the base of the tumor, 101 ctms. in circumference, the skin could be lifted up in folds. At the greatest height, however, the skin was firmly attached. Surface brown, and covered by numerous, irregularly situated, white, smooth, cicatricial spots; upon the greatest convexity several portions were œdematous, tensely stretched; the epidermis of these portions can be raised with ease. Upon pressure a moderate quantity of serum was discharged from a few openings. Through these openings a sound could be passed for several inches into a broken-down tissue.

The rest of the body showed sparsely, softly elastic protuberances, of lentil to walnut size, over which the skin was thinned. Upon section they presented a reddish gray granulation tissue. The tumor, as large as two fists, over the trochanter was due to pus-collection in the bursa mucosa. An incision into the left temporal muscle resulted in the discharge of pus. The temporal plane of the parietal bone, the greater wing of sphenoid and a part of the squamous portion of the temporal bone, were rough, uneven, and upon the edges surrounded by a very vascular osteophytic wall. The diploë of this portion contained vessels filled with blood. Upon the inner side of the rather thin skull, corresponding to the site of the division of the middle meningeal artery, was an abscess as large as a walnut. Meningeal artery was pervious; dura mater on its external side, corresponding to the abscess, covered by thick granulations; inner surface smooth; cortical surface of brain firm, moist, and reddish gray. Moderate quantity of clear serum in the subarachnoid space and in the ventricles.

The right arteria fossæ Silvii was plugged by a solid reddish thrombus, which extended into the three principal branches and could be traced into the internal carotid as far as the bifurcation.

Thyroid gland as large as a fist, filled with small cysts containing colloid.

The right lung attached to the thoracic wall. The middle lobe contained an old, encapsulated pus-focus. Subpleural ecchymoses at base of left lung.

Upon the convex surface and partly in the substance of the liver were several small encysted abscesses. Spleen attached to diaphragm and contained several old pus-foci. Right kidney contained an embolic focus; ovaries smooth; uterus virginal.

After the intestines had been pushed aside, were discovered solid bundles of pad-like, yellowish white tumors, covered by the mesentery and parietal peritoneum, and lying upon the quadratus lumborum. These tumors were enlargements of the anterior branches of the right lumbar nerve network. These nerve-tumors are represented in the figure below (Fig. 49).

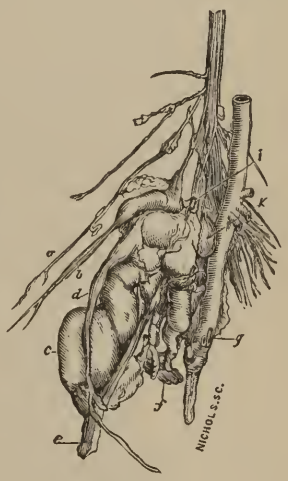


FIG. 49.—*a*, *n*, Ileo-hypogastrium; *b*. ileo-inguinalis; *c*, genito-cruralis. The terminal portion of this nerve, in the illustration lying alongside of the cruralis, crossed to the latter and took its course through the inguinal canal. *d*, *n*, Cutaneous ext. Its situation in the figure is wrong. It crossed the genito-cruralis and passed outward to the anterior superior spine. *e*, *n*, Cruralis; *g* aorta (place of division into iliaca); *i* and *k* neuromata which were within the spinal canal.

The lumbar nerve (*a*) was twice the size of the opposite one. The 2nd and 5th showed, at the place where the intervertebral ganglion should be, a pad-like, tortuous thickening, which in the majority of the anterior branches of the lumbar network reached as far as the nerves are contained in the abdominal cavity; of the ganglionic swellings two were within the spinal canal—ganglion *i* within the sac of the spinalis, whilst *k* had grown to the outside of the latter. The latter, on account of its size (4 ctms. long, 2½ ctms. thick), had flattened the cauda equina, without, however, having disturbed the anatomical character, or the function of its nerves. The intumescences of the ileo-inguinal (*b*) and of the genito-cruralis (*c*) were partly within the intervertebral foramina.

A freshly cut surface of the large tumor looked jelly-like, very moist, yellowish gray, very vascular, and tinged red. In places it was marbled and was of the consistence of the flesh of the sweet-water muscle. In a direction perpendicular to the surface it could be easily torn. Fine fibrillæ, similar to those found in many lym-

phomata and spindle-cell sarcomata, could be split off. Upon exposure of the cut or torn surface to the air it turned pale pink, like lymph-gland tissue. In tearing the tumor were frequently met slit-like caverns, filled with a clear, readily coagulating fluid. The same fluid exuded from the cut surfaces upon the slightest pressure.

The mass of the tumor was imbedded between the cutis and fascia, and forced itself between the single fat-lobes, so that a belt of fat-lobes ran through the middle of the cut surface. The development of vessels was as remarkable as in the patient's mother (case of Hecker). The veins as large as the little finger were supplied with valves and in their smaller ramifications possessed a sheath of lymphoid tissue. Partly running parallel with, partly crossing the larger blood-vessels, were found—thickly crowded in many places, more sparsely scattered at others—solid cords of medullary whiteness, of the thickness of a crow- to that of a goose-quill, which showed many bead-like swellings, and which were connected with the dorsal branches of the lumbar and sacral nerves.

The primary changes which led to the formation of the colossal tumor were best observed on the marginal portions. Along the larger vessels which ran between the fat-lobules of the subcutaneous tissue "there was an augmentation of the cells accompanying the adventitia, which partly possessed the form of migration cells, and partly the form of embryonal connective-tissue cells." This cell

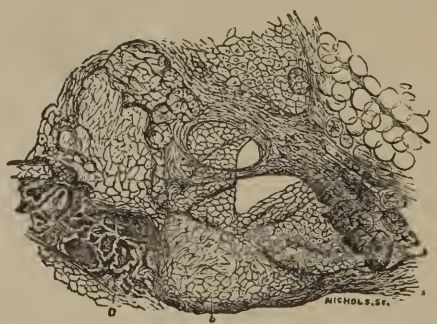


FIG. 50.—*b*, Caverns lined with endothelium. *c*, Juice-tracks in connective-tissue trabeculæ.

increase accompanied the smaller branches imbedded in the adipose layers and those which penetrated the fat-lobules and surrounded the separate fat-cells, but not those which penetrated into the cutis proper. Embryonal connective tissue was developed around the sudoriparous glands and in the adjacent fat-lobules. The more deeply-seated fat-lobules were forced apart by the cell new formation, which had penetrated in some instances between the separate fat-cells.

The covering epidermis was not thickened, the cells of the rete mal-

pighii were supplied with brown granular pigment. The corium was thinned and closely united to the mass of the tumor. The principal bulk of the latter consisted of connective tissue such as is found in the subcutaneous cellular tissue of embryonal life, or in myxomata; it was, however, in some places changed into solid, tendinous connective tissue, in others into adipose tissue, but always retained the laminous structure, so that along the vessels it could be split off in lamina which contained caverns between the fibres. A beautiful endothelium lined these caverns. See Fig. 50.

By a piercing injection a blue injection fluid was forced into the channel system of caverns, which was abundantly developed below the cutis and finally terminated in characteristically pronounced lymph-vessels, which were traced as far as the centre of the tumor.

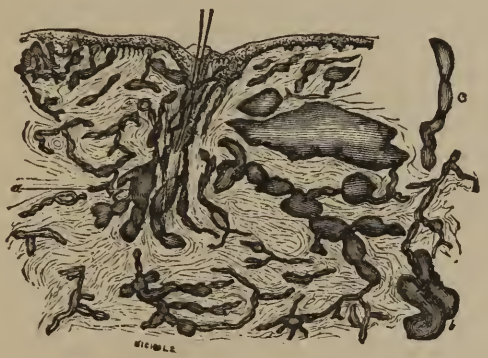


FIG. 51.—Lymph-vessels injected from greatest convexity of tumor. *a*, Lymph-sac around sebaceous gland. *b*. Sweat-gland convolution. *c*, Sweat-gland efferent duct. *d*, Lymph-vessel of papillæ.

The hair-bulbs and sebaceous follicles were sparsely present and atrophied; the efferent ducts of the sudoriparous glands were much elongated, the convolutions frequently lying 6 to 8 mm. below the surface. The glands were frequently drawn out of place. The sebaceous glands were surrounded by sac-like cavities (Fig. 51) which united towards the hair-bulb and emptied into lymph-vessels which accompanied the hair-bulb to the surface of the cutis, where they surrounded the bulb in a wreath-like manner and afterwards passed off into the superficial lymphatic network of the cutis, which frequently send centre lymph-vessels into single papillæ. From the bottom of the sac occasionally a lymph-vessel took its origin and ran towards the subcutaneous tissue. There were also found lymph-sinuses (Fig. 51, *b*) surrounding sudoriparous gland convolutions, and lymph-sheaths around an efferent duct (*c*), yet within the cutis. In a general view of the cutis covering the tumor a superficial and deeper layer of lymph-vessels could be distinguished. The superficial layer was composed of smaller vessels, which anastomosed in a narrow network

and gave off a central lymph-vessel, rarely a loop (*d*), to many papillæ. This layer was united by many branches with the deeper layer, which consisted of wider sinuous vessels, between which the sebaceous glands were situated. In the vicinity of the points of puncture the tensely filled lymph-vessels were covered with closely placed shorter and longer points, which Czerny regarded as the beginnings of the entering juice-tracks. It was further demonstrated that the juice-track system existed in the tissues of the tumor and were connected with large cavities forming a widespread system of canals.

In this case, which Czerny entitled "elephantiasis arabum congenita with pexiform neuromata," the tumor originated in a hyperplasia of the subcutaneous connective tissue, but in an embryonal form. The fat-cells were developed along the blood-vessels, and, in consequence of the close relation of the adipose with the connective tissue, it exhibits in some places new formations of connective tissue, and in other places fat-formations. As a whole the tumor characterized itself as a lymphoma, and presented in its interior structure conditions analogous to those found in several of the preceding cases.

Czerny claims to have found in the integumentary glands the periacinous lymph-caverns which Ludwig and Thomsa demonstrated for the seminal tubuli, Gianazzi for the salivary glands, and Boll for the lachrymal glands, and to have established a communication between the periacinous lymph-caverns of the sebaceous glands with the lymph-spaces of the skin. In a somewhat macerated cadaver he succeeded in penetrating with an injection from the periacinous caverns of the sebaceous glands the lymph-spaces of the skin, elevating the epidermis in vesicles. "The presence of these lymph-sheaths," adds Czerny, "around the sebaceous glands, explains why in many cases of epithelial carcinoma the masses of epithelium which take their origin from proliferating sebaceous glands grow at once into the lymph-vessels and upon section imitate their ramifications so exquisitely." Bizzozero, in a case of epithelial cancer of the cheek, injected the caverns around the cell-cylinders. What relation the continuity of these lymph-sinuses around the sebaceous gland follicles with the lymph-spaces of the integument may bear to the development of pachydermia lymphangiectatica, cannot be conjectured, but it may not be improbable that the return of the lymph is obstructed by the contraction of the muscular fibres.

The combination of this tumor with the nerve-tumors, which has not probably been observed to the same extent, is peculiarly interesting. It may have been merely a coincidence. Czerny regarded the neuromata as mainly consisting of connective tissue, in which ganglion-cells and marrow-containing fibres were disseminated, and suggests that the hyperplastic process may have extended into the neurolemma of the nerves, or that the affection may have been propagated along the lymph-sheaths of the nerves.

The cavities in the tumor must be designated cavernous lymph-spaces, for they were lined with an endothelium and were in communication with the tubular lymph-vessels; hence, its proper classification is among the cavernous lymphangiomata. The literature of the subject has supplied numerous cases of ectasia of lymph channels, but the instances of simple and cavernous lymphangiomata are comparatively rare. The cases observed by Amussat, Nélaton, Drinkard, Trélat, Petters and others, of ectasia, cannot properly be classed among the lymphangiomata, nor can the case of lymphangioma adnatum (75) observed by Hofmoke, in the absence of an anatomical examination, be certainly enumerated in this group, notwithstanding the evacuated fluid contained albumen, fibrin, globulin in a small quantity, and the salts of the blood-serum. Virchow was the first to invite attention to the cavernous structure of macroglossia, and the cases of hypertrophic tongue and macrochilia described by him and Billroth must be accepted as typical illustrations of the cavernous structures of the lymph apparatus. Virchow is undecided whether the caverns proceed from a progressive proliferation of the connective-tissue cells, or whether the lymph-vessels and connective-tissue corpuscles are affected simultaneously. Billroth assumes the connection of the cavernous spaces with the lymph-vessels, and that the cavernous degeneration originates in the connective-tissue cells, the "multiplication of their nuclei either producing a solidifying connective-tissue substance, through which the fibrous form of macroglossia originates, or else the interstitial substance generated by the cells is fluid, which leads to the origin of the cavernous form." Maas found in three of four cases of hypertrophy of the tongue a cavernous tissue, but the caverns contained red blood-corpuscles and fibrin-coagula, and he concluded the cav-

erns were partly thin-walled veins and partly "thickened arteries." Lymph-spaces were not demonstrated in the cases of Fischer or Waldeyer. Others have found only hyperplasia of the tissue composing the tongue, and others again have confirmed the observations of Maas. Gies demonstrated hyperplasia of connective tissue with abundant infiltration of round cells, and tissue-spaces containing coagulated lymph and lined by a distinct endothelium. Arnstein, in a case of macroglossia, observed considerable enlargement of the glossal papillæ, and in the parenchyma distinguished two kinds of caverns, "one round and filled with red blood-corpuscles and fibrin threads, the other irregular, sinuous, with granular contents and scattered lymphoid cells." The former were probably ectatic blood-vessels, as observed in the cases of Maas, and the latter dilated lymph channels or spaces. In Arnstein's case the connective tissue, as in the case of Gies, was infiltrated with numerous round cells, which were grouped in forms resembling lymph-follicles. This adenoid structure he believed developed from the lymph-cells.

The succeeding case of "lymphangioma, with general enlargement of the limb and elephantiasis of the toes," reported by Sydney Jones,[1] though not of congenital origin, presents additional opportunities for the study of these developments, and offers an explanation of the phenomena observed by Maas in three cases of hypertrophy of the tongue, which he, perhaps, improperly ascribed to the cavernous expansion of thin-walled blood-capillaries.

Case LXXXIV. A laborer, æt. 31, admitted to the hospital in 1874, had been seized, seven years before, with a painless swelling of the right thigh, consisting of knotty enlargements situated on the back and inner surfaces of the thigh and between the buttock and thigh. These swellings, at the time of admission, looked like varicose veins, varied in size from a pin's head to a vessel of about the diameter of one's little finger, some were pinkish and some white, with fluid contents. Most of them emptied on pressure, to refill on removal of the pressure. They often discharged spontaneously a white, milky fluid, sometimes as much as one or two quarts a day, at intervals varying from a week to a month. See Fig. 52.

The skin on the toes and lower third of the thigh was tuberculated

[1] St. Thomas' Hosp. Rept. New series. Vol. V., p. 295.

and brawny. At other places were tuberculated prominences, from some of which a milky fluid was occasionally discharged.

The patient stated that when he had been free from any discharge for some time, hard, painful lumps appeared in the right inguinal region. In the left groin several enlarged glands could be felt.

Dilated vessels of the same character could be traced in the scrotum, involving the right side, but encroaching beyond the median line, showing white prominences, not larger than a pin's head, on the left side.

FIG. 52.

The whole of the right limb was much larger than the left, and always greatly increased when the patient was walking, or the limb hanging. It constantly increased during his stay in the hospital, and was several times attacked with an erysipelatous inflammation, accompanied with considerable constitutional disturbance, pain, redness, and marked engorgement of the lymphatic vessels. These attacks were greatly relieved by a copious discharge of milky fluid.

Analysis of the discharge by Dr. Bernays showed a vast number of minute granules giving the milky character, lymph-corpuscles, and a few red blood-corpuscles. It contained from 1.56 to 4.27 per cent. of fat, and about 6.43 per cent. of albumen, coagulated firmly and was inodorons.

Mr. Charles Stewart submitted two portions of the skin to a microscopic examination. One, which was removed from the back of the right thigh, formed the external wall of a semi-transparent bulla. This specimen exhibited "large, freely communicating chambers lined by a continuous layer of endothelium, presenting considerable variety of forms in different parts. The chambers were traversed in numerous places by trabeculæ; the remains of the skin which formed the outer walls of these chambers appeared much thinned, with probable flattening of the papillæ." There can be but little doubt, adds Mr. Stewart, but that these chambers were greatly dilated lymphatic vessels.

Vertical and horizontal sections of the brawny, congested and nodular skin removed from the dorsal surface of the toe "showed great hypertrophy of the connective tissue of the cutis with elongation of the cuticular portion of the sudoriparous ducts; but the most remarkable feature was, besides the presence of large, thinned walled canals (lymphatics) in the deeper portion of the tissue, the existence of large spaces in the papillæ, often traversed by trabeculæ and lined with proliferating endothelium. They in some places freely communicated with subjacent blood-vessels, probably veins, and by their distention had produced great condensation of the surrounding connective tissue of the papillæ and compression of the cells of the neighboring rete mucosum. Normal blood-vessels could be seen running by the sides of the spaces, especially in those sections taken in a horizontal direction from the skin."

"The interior of the dilated chambers in the papillæ being often traversed by trabeculæ, and the presence of normal blood-vessels by their sides, would lead one to suppose that they were dilated lymphatics or lymph-spaces which had become continuous with a neighboring blood-vessel by rupture, the blood during life rather regurgitating into the lymphatics than flowing directly into them."

"But the direct continuity of the walls of the blood-vessels and space might lead one to suppose the blood-vessel itself by dilatation forms the space; if so, the trabeculæ would be the connective tissue between the capillary loops."

"In addition to the above there were also occasionally beneath the epidermis small circumscribed areas traversed by fine fibres and cells; these were probably produced by local distention of the lymph-spaces compressing and producing the removal of the greater part of the bundles of connective tissue, leaving only fine fibres in their place. Minute spaces filled with blood

were not infrequent at different levels between the cells of the epidermis, having escaped from the distended chambers beneath."

The appearances found in the vertical section of the outer wall of the "semi-transparent bulla" are similar to, though more exaggerated than, those observed in a section of the integumental covering of the vesicles present in Case 1. In the latter many of the spaces (see Fig. 8) communicated, but an endothelial lining was not recognized. Stewart also recognized lymph-spaces in the papillæ of that portion of the integument which was congested, which corresponds closely with the conditions described by Teichmann (see Fig. 37) and Odenius. And the fact that such large lymph-spaces were only observed in the papillæ of those parts of the integument in which inflammatory changes had taken place, and not in the papillæ of the covering integument of the bulla, confirms the theory of Odenius, that when found in the cutaneous papillæ they are newly-formed lymph channels.

The additional observation, by Stewart, of intercommunication between the spaces found in the papillæ and subjacent veins may afford an explanation of the origin of the pigment deposits, which have been so frequently found in cases involving dilatation of lymph channels. So, likewise, may the collections of blood, occasionally present, be accounted for.

Winiwarter[1] observed a case of congenital macroglossia combined with hydroma cysticum colli congenita, in a boy 14 months of age, who died soon after the operation upon the tongue.[2] The tumor upon the neck consisted of several large cysts, which penetrated between the muscles of the floor of the oral cavity, and passed into the cavernous tissue of the remaining stump of the tongue.[3] The tongue

[1] Langenbeck's Archiv f. klin. Chir., Vol. XVI., p. 655, cited by Weichselbaum.

[2] Tizzoni and Parona have published résumé of all the cases of lipoma linguæ in the Annali Universali di Medicina e di Chirurgia for March, 1877. Also Month. Abst., Sept., 1877, p. 417.

[3] Prof. Michel, of Nancy, in a report of seven cases of ranula, denies that there was in either of the cases any connection between the cysts and the salivary canals. In all the cases the cysts "had originated in the areolæ of the connective tissue about the frenum of the tongue." Gaz. Hebdomad., Nov. 16, 1877. Also Monthly Abst., Sept., 1877, p. 416.

Talko reports a case of microphthalmus coexisting with a "congenital serous cyst of the orbit." In his summary of six cases he says that such

itself contained variously large and variously formed caverns, which were filled with granular coagula, or with blood-corpuscles and lymph-cells; in several places the connective tissue was infiltrated with new-formed cells. Winiwarter believed that a portion of the caverns originated from dilatation of pre-existing lymph-vessels, but that a majority were developed by division of the connective-tissue cells, which brought about a new formation of round cells, which grouped in masses as in Arnstein's case, and became encapsulated with connective-tissue fibres. In the centre of the follicular masses disintegration of the cells takes place, progressing towards the periphery and thus leading to the formation of a cavern, which gradually is filled with a serous fluid, still containing the cell remains as a finely granular mass.

Weichselbaum suggests another mode of development of the caverns. The follicular proliferations become saturated with serum, "their cells are forced apart and in part disintegrate, whilst the supportive tissue with its mesh-cavities remains; finally this also disappears, and the small mesh-cavities unite together into larger caverns." Czerny, who examined the tumor removed from the thigh of the patient of Gjorgjewic, reached the conclusion that the cavernous spaces were formed from the granulation tissue which developed around the lymph-vessels. Volkmann traced the caverns of the hypertrophic tongue to a degeneration of the tongue papillæ.

Cavernous lymphangioma are identical in structure with the cavernous blood-tumors, hence the inference is clear that the developmental process is the same. Various theories concerning the origin of cavernous tumors have been suggested (Rokitansky, Virchow, Rindfleisch, and others), but the question remains unsettled. Rindfleisch (*Text-book Path. Anat.*, p. 144) asserts that every tissue supplied with blood-vessels can be transformed into cavernous tissue, the only pre-requisite being

"cysts are commonly covered with the conjunctiva," and "are usually filled with yellow serous fluid, rich in albumen," Zehender's Monatsblätter, Apr., 1877; also Month. Abst., Sept., 1877, p. 415.

Tizzoni and Parona have also reported a case of fibro-lipoma of the spermatic cord. Microscopic examination of the extirpated tumor "showed ordinary adipose tissue with fibrous septa and abundant vessels and nerves." The "vessels were affected with obliterative inflammation, being in some places completely occluded with proliferated epithelium. In the sheaths of the nerves, also, they noticed a dilatation of the lympathic spaces, together with a thickening of the sheath and infiltration of the same with leucocytes." Ibid., p. 419.

the presence of germinal tissue, which, by the cavernous metamorphosis (loc. cit., p. 145), is converted along the vascular walls into spindle-cells and fibrous connective tissue, by which "a retraction vertical to the axis of the parenchymatous trabeculæ" and dilatation of the vascular tract are brought about. This excludes the hypothesis of new formation of blood-vessels or caverns, upon which Virchow insisted. All these hypotheses (Rokitansky's excepted) agree that the new formation of round-cell tissue is intimately concerned in the origin of caverns.

Billroth, Lücke, Koester, and others have classed the congenital cystic hydroma of the neck among the cavernous lymphangiomata. They consist (Weichselbaum) of a connective-tissue trabeculæ, within whose branched and intercommunicating caverns a serous fluid is contained. It would unnecessarily lengthen this memoir to reproduce the numerous cases, and I must therefore be content with a simple recital of the more characteristic phenomena, for which I am indebted to Wernher,[1] who collected and analyzed fifteen cases. This form of congenital cavernous formations occurs most frequently among the female, has been usually observed in immature children, and generally complicated with other malformations. The tumor always (Steinwirker) has its principal seat at the lower portion of the occiput and the upper part of the neck, is spheroidal, with a smooth surface, and divided in the median line of the body by a furrow into two symmetrical halves. In some cases the tumor extended from the ridge of the occipital bone to the middle of the scapulæ, and anteriorly to the ears. In one case it extended forward on both sides, until its two halves nearly touched each other in front. Fluctuation is very constantly present in some part. In all cervical hydromata (Steinwirker) the integument of the entire body was infiltrated with serum, and in one case the œdematous skin was formed into folds, beneath which were many cysts filled with a clear fluid. They are usually composed of two symmetrical cysts, divided into smaller compartments. The walls of the cysts are generally very delicate and transparent, but occasionally more firm and fibrous, resembling the pericardium. The cysts are frequently separated. In Wernher's case, the

[1] Congen. Cystic Hydromata, Giessen, 1843.

walls consisted of distinct fibre-bundles, and in the fluid of the cysts floated many epithelial cells.

In cystic hydroma the cavities present simple cystic conglomerations (Steinwirker), or empty into each other. Wernher found epithelium in the cysts; Steinwirker demonstrated an epithelial lining of their walls, which are formed of condensed connective tissue. Both investigators found serum in the mesh-cavities. Steinwirker insists that cystic hydroma, like congenital elephantiasis, find their origin in congenital dilatation of lymph-vessels, which conclusion is corroborated by the discovery of epithelium in the cysts containing serum and the presence of lymph channels in the connective tissue. If the dilatation of the lymph channels be only moderate, the cysts will be small, but in proportion to the degree of the ectasia will the cysts increase. With enlargement of the cysts fluctuation becomes more or less recognizable. Koester demonstrated in a case of cystic hydroma of the neck the general communication of the closely-crowded caverns with each other. He also proved the "direct transition of the cysts into ampullary canals and spaces, and recognized the connection of the latter with the sinuses of lymph-glands."

Cystic hydroma of the neck must therefore be regarded as lymphangiectasiæ, presented either in the form of circumscribed tumors or diffuse developments. In fact, the diffuse character of the affection pertains to all the cases, for Wernher asserts that "in all cases the integument of the whole body was dropsically infiltrated, in many cases so much so that the large tumor of the neck barely protruded." Accepting then the diffuse rather than the circumscribed nature of the affection, the two forms must be regarded as analogous diseases, differing only in the size of the existing cysts, and both forms must be classed among the congenital lymphangiectasiæ. Steinwirker suggests that both forms are advanced stages of congenital elephantiasis, produced by enlargement and growth of existing cystic dilatations. He also asserts that "only the colossal hyperplasia or dilatation of the lymph-vessels distinguishes lymphangiectasiæ congenitæ from elephantiasis lymphangiectodes, in which the hyperplasia of the connective tissue, although the development of the lymph-vessels is also exces-

sive, still occupies a position predominant in a manner similar to that belonging to acquired elephantiasis."

The cases of Steinwirker (No. 6), Meckel (No. 7), and of Jacobi (No. 12½), supply illustrations of this class of cases. The careful dissection and microscopic examination by Steinwirker established the lymphatic nature of the developments in his case, and justify its classification in the same category with congenital macroglossia, as described by Virchow; the latter exhibiting the circumscribed form of congenital lymphangiectasiæ, the former the diffuse variety.

The succeeding case (85) of chylangioma cavernosum presents another variety of cavernous lymphangiomata, which is entirely unique in its mode of origin. Weichselbaum has reported a case under the same title (see Case 50, *N. O. Med. and Surg. Jour.*), but his was a tumor of the mesentery, caused by occlusion of the chyle-vessels, in which a cavernous expansion of the lymph channels had ensued. I reproduce without comment the case in full.

Case LXXXV.[1]—Jane L., daughter of a laborer, who lives in rather poor circumstances, was born April 20, 1876, the seventh child of a feeble mother, who, though she wore an aged look at an early period, was said to be healthy. The other children all died soon after birth, or else in early infancy. Immediately after her birth, mother and nurse were struck by the unusually large abdomen of the child; a physician was called in and stated that the child would hardly live, because it had a tumor in the abdominal cavity. Yet, in spite of her decrepit appearance, the child rallied, took the breast properly, and developed, although very slowly. The size of the abdomen, however, increased steadily, although with the exception of a tendency to constipation, which had to be overcome by frequent injections, no real symptoms of disease were noticeable. It was only at the age of four months that the abdomen had attained a size to interfere with respiration; the child vomited frequently whenever she had nursed somewhat rapidly; the water injections failed, and senna was given repeatedly; yet evacuations remained retarded, and the intestines distended by gases, by which respiration was still more impeded. First seen in dispensary, August 22, 1876, æt. four months. Status: body feeble; muscles but little developed; face somewhat cyanotic; thorax in its lower circumference strongly expanded; abdomen exceedingly enlarged (65 ctms. in circumference), tense, drummy, but not quite symmetrical. In spite of the colossal expansion there is distinct stronger bulging of right hypochondrium,

[1] Winiwarter. Jahrbuch der Kinderheilkunde, etc., Vol. XI., Nos. 2 & 3, 1877, p. 196.

passing without sharply defined limits into the surrounding region. Palpation out of question on account of tension of abdominal walls. Percussion gave exquisite tympanitic sound over entire anterior region; decided dulness in lateral portions, changing its level when the child was placed upon one side or the other. The exact limits of the latter could not then be made out; only this much was certain, that there must be free fluid in the cavity. The cause of this hydrops could not be demonstrated. Lower extremities not œdematous; no albuminuria. The pressing indication was paracentesis, in order to relieve difficulty of breathing. An exploring trocar was passed into the left epigastrium at a perfectly dull spot, and after removal of the stylet, to the surprise of all present, there was evacuated in a large jet a fluid looking exactly like milk. The resemblance was all that could be imagined—the same color, the same consistency, nay, even the same odor like fresh milk. Slowly (on account of the small canula) a quantity of about three litres was discharged; I then removed the trocar before complete evacuation of the abdomen, in order not to lower pressure too suddenly. Although the abdomen had become much smaller, yet the tympanitic intestines rendered examination difficult. There still was prominence of right hypochondrium, and corresponding with it dulness extending from the hepatic dulness, from about the medial edge of the right lobe, and passing across the edge of the liver obliquely downward, where it merges into the dulness due to yet remaining fluid. It does not change its position in the upper portion upon assumption of the lateral posture. At this place there is felt upon deep palpation a tumor composed of several somewhat movable portions, apparently attached to the spinal column behind, and in consistency corresponding to a flaccid cyst or a conglomeration of such cysts. Fluctuation cannot be shown with certainty. An exact definition from the anterior edge of the liver is possible; whether the tumor is connected with the lower surface of the liver cannot be decided; it is not grown to the abdominal walls, and respiration does not displace it as a whole. No further revelations could be obtained.

Above all, the milk-like fluid engaged our attention. It had a weakly saline taste; did not coagulate upon standing, but deposited a thick layer upon the surface, as milk deposits cream. The microscope showed no formation developments, with the exception of sparse cells, analogous to milk-globules. The idea lying next was to regard this fat-emulsion, for such it was, as pure chyle, and this hypothesis was confirmed by the chemical analysis made by Prof. Ludwig with great exactness, the results of which I will present farther on, as they were furnished by Prof. Ludwig.

This fluid being looked upon as chyle, the question now arose, how does it get into the abdominal cavity, and what is its connection with the palpable tumor? Before entering upon the diagnosis, I will briefly furnish the further data of the case up to date (February 12, 1877), for the child still lives in a condition entirely unchanged.

Paracentesis had no local disturbing influence, and was followed by decided general improvement; the child again began to take food (she receives, besides the mother's milk, a little broth); respiration became free; vomiting, constipation, etc., disappeared; but the fluid reaccumulated rapidly, necessitating a second tapping on September 12, 1876, by which, as well as by all those following it, the same fluid was evacuated to the amount of two to three litres at each operation. Tapping repeated November 18, December 19, and January 16, 1877; in the intervals the child sometimes suffered from diarrhoea, bronchitis, vomiting, etc., yet remained in a general fair condition of nutrition, though very slowly increased in size. Always felt worst before tapping; the latter always met an indicatio vitalis, because by the distention of the abdomen all reception of food was rendered impossible; after tapping, rapid recuperation. Upon the two last occasions I used (always in the left hypogastrium) a larger trocar, and emptied the cavity nearly completely. We now were able to recognize the tumor and its composition by several soft, flaccid pieces. Point of origin remained unsettled.

The chyle-fluid can only reach the abdominal cavity in two ways; 1st. By transudation. 2d. By solution of continuity of a larger chyle vessel. Cases are shown in which, after plugging or compression of the thoracic duct, a milky fluid was found in the pleural and in the abdominal cavities, a phenomenon of stasis, the explanation of which affords no difficulties. In no case, however, were such immense quantities of milk-like fluid found, nor was there observed in these cases such a constantly continuing and rapid accumulation; on the contrary, the results of the autopsy led to the conclusion that the transudation of chyle from lymph-vessels distended by stasis decreased in time, and for the simple reason that the lymph-vessels became impermeable. The milky fluid in them becomes inspissated into a cheese-pulp when efflux is insufficient, which gradually fills entirely the dilated vessels, and thus renders reception of new lymph impossible. In the free transudation also there were found precipitates, which led to the conclusion of the existence of a change in chemical composition. In the case under discussion transudation is indeed possible, if we assume that some obstacle prevents the flow of chyle from the entire intestinal track. It is difficult to determine in what this obstacle consists. It is most plausible to look upon the tumor as the obstructing agent. As to the point of origin of the tumor, two opinions may be held. It either had developed from the right kidney, or it proceeded from the retro peritoneal lymph-glands. I thought of hydronephrosis, of carcinoma of the kidney, of hyperplasia of lymph-glands, of everything before I was able to more accurately palpate the tumor. But the more I thought of the matter, the more I reached the conclusion that the tumor was not cause, but effect of the chyle stasis, and I finally formed the following hypothesis: there exists an obstacle in the discharge of chyle from the abdominal cavity into the thoracic duct. The latter evidently performs its functions, because there exists no other visible phenomenon of

stasis. The obstacle is congenital; as to its nature, I cannot express even a supposition. Now, at the root of the mesentery, there have been formed, probably out of the large chyle vessels, cystic cavities (evidently in intra-uterine life already), entirely similar to those met with in hygroma colli cysticum and in macroglossia. How easily such cyst-formation from the lymph-vessels of the peritoneum is brought about has been proved, among others, by Wegner's experiments. He injected air into the peritoneal cavity of rabbits, so that they were blown up, so to speak, and continued this for weeks and months. The air was resorbed in greater part. Upon section of the animals, which had remained perfectly healthy, there were regularly found, at the root of the mesentery, cyst-like vesicles of nut-size, filled with air, and which, as could be proved by the lymph-vessel endothelium upon their walls, were nothing less than cystic dilated lymph-vessels. This cystic tumor in our case is not filled with air, but with pure chyle, for the simple reason that it is fed from the lymph-system of the intestine, *i.e.*, directly by the products of nutritive absorption. The matter remained up to a certain point of time, which at present cannot be determined, thus: that there existed in the abdomen a large cystic tumor, but no free fluid. Finally, one of the cysts broke, probably before birth, the fluid poured into the peritoneal cavity, and this communication exists at present. Only by these abnormal conditions can we explain how chyle formation proceeds entirely without hinderance, and that stasis has not already led to inspissation of chyle and to obstruction of resorption from the side of the intestine. Whatever is absorbed from the alimentary canal passes into the abdominal cavity. Now it would be supposed that this enormous loss of nutritive material would lead to very rapid inanition, and that the child must perish in a short time. That this does not happen, that the child lives, although *per se* it takes but little, and loses two litres of chyle every second month, is explained by the conditions of resorption of the peritoneum. The peritoneal cavity represents a large absorbing apparatus, whose capacity by far exceeds all conception. The direct road to the blood being denied to the chyle, the child can only be nourished by such portions of chyle as are resorbed by the peritoneum. This quantity is probably very considerable, as the fluid in the abdomen is under a high degree of pressure. The thoracic duct being assumed as obstructed, yet a sufficient number of other roads remained by which a sort of collateral chyle-circulation could be developed; especially the centrum tendineum of the diaphragm, the lymph-vessels of the parietal walls of the peritoneum, finally resorption upon the part of the blood-vessels. Thus it is explained, that in spite of losses of chyle the child was living, and has continued to develop. The communication of the chyle-cyst with the peritoneal cavity is of great importance in this respect, because it alone renders possible the continuance of work of the entire nutritive and absorbent apparatus, although the work is done at a loss. If we consider that a child of the age of our patient takes up in twenty-four hours about two litres of milk (maxi-

mum), and that probably all that is absorbed finds its way into the peritoneal cavity; that furthermore the quantity of solids in the chyle evacuated is approximately as large as that contained in the milk, we can form some estimate what proportionately small fraction of the chyle formed in twenty-four hours cannot be overcome by the resorption of the peritoneal surface, and remains in the peritoneal cavity. For only in the space of a month the quantity of fluid in the cavity reaches to two litres—*i.e.*, as much as is sent to the intestine in twenty-four hours. It is self-evident that this calculation is not exact, but it suffices to form a conception. Immediately after tapping absorption indeed must be somewhat diminished; there may even occur a transudation, because the sudden release to intra-abdominal pressure is calculated to produce hyperemia ex vacuo; afterwards, *per contra*, resorptive activity is again favored by the facilitated mobility of the diaphragm. How long the mechanism will continue to work in this manner, *i.e.*, how long the child will live under these conditions, cannot be exactly determined. Spontaneous cure can hardly be expected; whether surgical interference might improve the condition, I will discuss presently. When I first examined the patient after tapping, the case appeared unique. There have indeed repeatedly been observed effusion of chyle into the large serous cavities, also into cavernous lymphangiomata, vide Gjorgjewic, Quincke, Weichselbaum; but nowhere was found a similar co-existence of an abdominal wall composed of lymph-cysts of such size, and hydrops chylosus as in the present case. A few weeks after I found an entirely analogous case in Schmidt's Jahrb. (Wilhelm's).—See Case 42, *N. O. Med. and Surg. Jour.*

W.'s case proves what might be doubtful *a priori*, viz.: that a condition of this kind need not immediately lead to death. Therefore, in my case there existed no vital indication to operate. As, however, the parents asked again and again whether nothing could be done to cure the child, I commenced to meditate upon operative interference and its result. Here a circumstance existed which must offer an insurmountable obstacle—the uncertainty by what the stasis was caused. Even if by opening the abdomen in the linea alba, the chyle-tumor could have been drawn out and ablated at its root, there would probably have been no change in the chyle stasis; *per contra*, by extirpation of the cysts formed by dilated lymph-vessels and ligation of the pedicle, all, or at least the majority of the efferent canals, would have been placed out of function, and in a very short time there would necessarily have been stasis transudation, by which the condition of patient would have been essentially the same as before operating. The obstacle compressing the thoracic duct may also be in the thoracic cavity, it may be an enlarged bronchial gland, and even if situated in the abdomen, it may not be discoverable; in short, the diagnosis in this respect is to ascertain that in view of the possibility of continuance of life with the presence of the chylangioma, as shown by experience, there can be no thought of so severe an operation as laparotomy in a child five months old. Accordingly, the mother was

directed to properly feed the child; up to date it still receives the breast and broth—with some meat. In a short time it will have to be weaned, because the mother begins to suffer; it will then be seen what effect change of diet will have upon the diseased condition.

Résumé of Ludwig's Analysis.

Fluid was odorless, of milky appearance; reaction alkaline; after standing there were found single fibrin flakes at the bottom of the vessel; its surface showed a layer of cream. Specific gravity 1.012.

Chemical Analysis.

	Per 1,000 parts.
Albumen	45.01
Fat	76.80
Sugar	0.20
Chlorine	3.41
Sulph. acid anhydr. (SO_3)	0.23
Phosphor. " " (P_2O_5):	
united with alkalies	0.14
" " alkal. earths	0.01
Carbon. acid. anhydrid. (CO_2):	
united with alkal	0.484
" " " earths	0.099
Potassium	0.24
Sodium	2.85
Calcium	0.077
Magnesium	0.016

This analysis refers to the fluid of September 11, 1876; the fluids from previous and subsequent tappings had the uniform spec. grav. of 1.012, and upon evaporation by heat always showed the same amount of solids.

Before proceeding to the consideration of another anomaly presented in Case 1, I must introduce the two succeeding cases. They should have been considered immediately following the history of Case 1, but one of them had not then been reported, and the report of the other case did not reach the library of the Surgeon-General's office until too late for insertion among the group to which it properly belongs.

Case LXXXVI.[1]—History unknown. Tradition states that the preparation had passed from a private collection as a gift into the anatomical museum of the University of Giessen. A female fœtus, weighing 3 lbs. 14 oz., apparently fully formed, small and of weakly build. Fontanelles widely open. Right lower extremity three times as

[1] Cuny. Dissert. Inaug. Giessen, 1865.

large as the left, right foot somewhat rotated inwards, and nearly four times as large as the left. Integument of entire extremity thick, leathery, and in numerous folds, more marked posteriorly. In the vicinity of the anus and at the lower edge of the gluteus maximus, a swelling began which extended to the inner side of the thigh, and passed in the hypertrophic right portion of the mons veneris. It was soft, elastic, and retained the pressure mark. Upon the integument of the leg were small wart-like elevations. The right foot represented a misshapen mass, extending from the ankle to the point of the foot. Second and third toes of left foot elongated. See Fig. 53.

Dissection exhibited enormous thickening of the adipose layer, with cavernous formations in the subcutaneous cellular tissue. The tumor previously mentioned consisted of fat, in which were several caverns communicating with the ends of veins. Lobular, cock's-comb-like excrescences projected into the caverns.

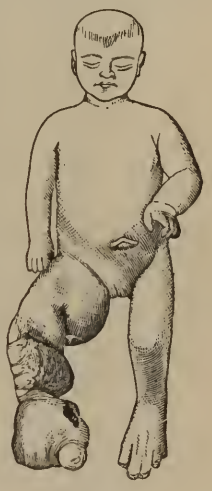


Fig. 53.

The whole tissue of the anterior side is spongy, covered by numerous openings of vessels; posteriorly there are also several such caverns, especially in the middle of the thigh and middle of the leg, also lined with excrescences and communicating with veins as previously described. The entire diseased part was abundantly supplied with enlarged veins, with thickened coats, which in some places were dilated into large sacs. The right iliac from its point of entrance into the true pelvis was expanded into a large sac, with thin walls, and filled with a trabecular network. This sac passed into the great ischiatic notch and below the spine of the ischium. Arteries and veins normal.

The condition of the lymphatic vessels could not be demonstrated. No special irregularity in the muscles. Those of the foot were displaced on account of bedding in of a fatty, fibrous tissue. Bones of the foot enlarged, elongated and thickened. Ductus Botalli open.

Case LXXXVII.[1]—Eugene Berry, nine years old. Family free from constitutional vice. A half-brother had an additional finger on each hand. At birth his feet presented the same malformation as at the time of the examination, but they were as small as the feet of other babies. The left hip was slightly enlarged, but the thigh and leg were normal in shape and size; otherwise his form was perfect. His health has always been good. During the fourth week his parents observed the excessive growth of the left leg and foot, which was very marked at the close of the first year and has continued

[1] From a report by Drs. Woods, Collamore, and Fisher, a committee of the Toledo Med. Association. Toledo Med. and Surg. Journal, Vol. I., p. 129, 1877.

uninterruptedly since, but has never been accompanied by soreness, redness, pain, or any observable morbid process.

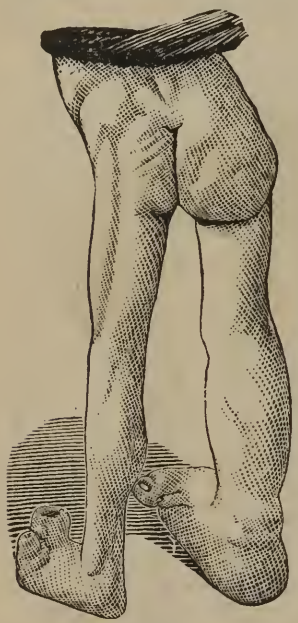


Fig. 54.

The right nates presents a rather even, bulbous enlargement, projecting backward and extending beyond the posterior middle line about one and one-half inches, and dropping below the opposite buttock two inches. The right buttock measures three and one-half inches more in circumference than the left. On the right hip, as shown in Fig. 54, near the trochanter major, is a small enlargement, which, like the enlarged buttock, presents a slightly irregular but smooth surface, and is soft and doughy.

The right thigh (see Fig. 54) is somewhat enlarged, being fourteen inches in circumference, while the left measures but eleven and one-half inches. Neither the thighs nor the legs are elongated, and the knees are normal. The right leg is enlarged, the soft tissues presenting an elastic feel and a somewhat irregular surface. Its greatest circumference is fourteen and one-half inches, while the healthy member is but ten inches. At no time has any enlarged or varicose veins been observed, but at the time of the examination the surface was slightly congested. The right tibia is much enlarged, the development seeming to have been lateral, as the fingers can be pressed beneath a ridge on both sides. (See Fig. 55.)

The right os calcis is much enlarged, as are also all the tarsal bones. The metatarsal bones are thickened and elongated. The right great toe is slightly developed, but perfectly formed. The second and third are joined together and turned inward at a right angle. The remaining toes, three, making six on the right foot, are hypertrophied and turned downward, curving towards the sole of the foot. The circulation, muscular power, and sensibility are unimpaired. Motion is complete.

The left foot is much less deformed, and has developed less rapidly. The great and second toes are nearly normal. The third and fourth are webbed, project forward, and are turned up. Both little toes are much enlarged. On the sole of the left foot is a massive cushion.[1]

"The increased growth," remarks the reporter, "has not interfered with the relation of the parts, as the joints, even of the toes, are

[1] To Dr. Chapman, of Toledo, I am indebted for the opportunity of supplying the illustrations in this case.

perfect in action, save from the interference of the superabundance of the surrounding soft tissues. The action of the muscles of the feet and legs are also perfect. No varicosity has ever been observed, although the circulation through the lower extremity has been from birth above the normal standard."

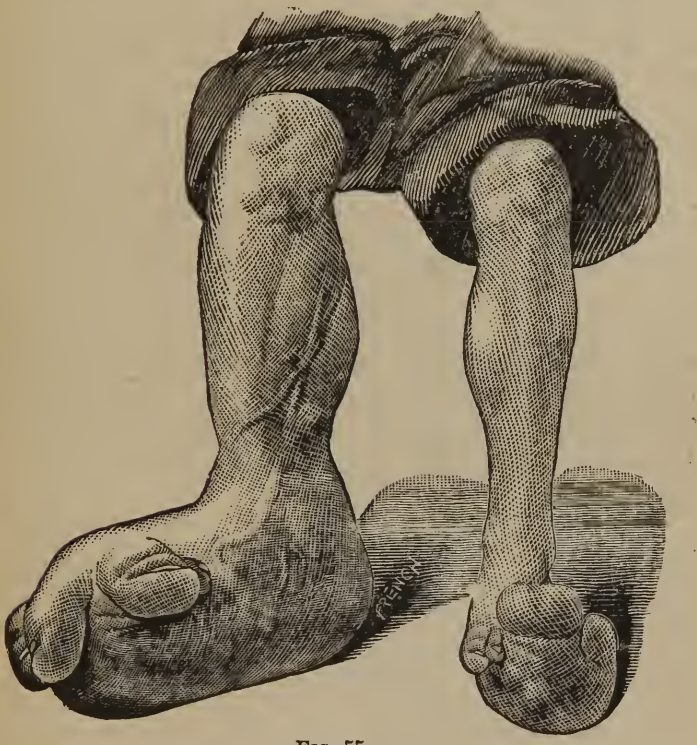


Fig. 55.

These cases (86 and 87) present many phenomena analogous to those previously described in Cases 1 and 8. The case of Cuny presents the structural alterations found in Case 8, and yet exhibits the same marked lobular formation of the panniculus adiposus of the thigh which characterizes the enlargement in Case 1. It also presents the interesting phenomenon of apparent transformation of the adipose formation into bloody tumors. The latter case (No. 87), in addition to its analogies to Cases 1 and 8, also resembles, in the preservation of normal sensibility, temperature, muscular power, and

progressive excessive growth, the conditions present in Reid's case (No. 35) of increased nutrition of the left thoracic extremity, and Chassaignac's case of colossal development of the right extremities. Both of these cases probably belong to the second group of giant growths.[1]

To recur to the consideration of Case 1. In the description of the post-mortem appearances, I invited attention to the extra-peritoneal abdominal tumor, which consisted of five cysts (see Fig. 6) filled with blood-corpuscles, granular matter, and debris which I suggested were devastated lymph-glands. The inference seemed probable that the acompanying disturbance of the lymph circulation found its cause in the obstruction presented by these obliterated glands. Among the congenital cases which I have been enabled to collect and reprodnce in this memoir, no condition analogons to this phenomenon has been recognized. Fortunately, however, the following case, occurring in a female aged twenty-three, reported by W. Petters, supplies data which may satisfactorily explain the condition referred to. The case is so interesting and so replete with valuable information that I reproduce it in full.

Case LXXXVIII.[2]—M. N., æt. 23, wife of a private officer, daughter of healthy parents, began, three and a half years ago, to suffer from her present affliction. Healthy when a child, she menstruated first between the fourteenth and fifteenth years, since when the menses have recurred every three weeks, lasting for three days. Three years and a half ago she noticed, upon rising from the bath, a white papilla about the size of a pin's head, upon the left labium majus. This she scratched. This being repeated, a yellowish white fluid dribbled away from time to time. As the patient was engaged to be married, a so-called sexual physician was consulted, who treated her for six weeks by application of tincture of iodine. The discharge became less, and ceased for six months, when she again saw a few white drops. She now noticed that the white papillæ had mean-

[1] Dr. Henderson (Edinburgh Med. Jour., Aug., 1877, p. 123) reports the case of a boy aged sixteen, which presented a remarkable hypertrophy of the right hand and arm. He regarded the case as probably an example of elephantiasis teleangiectodes, as described by Kaposi in the third volume of Hebra on Diseases of the Skin. The cut accompanying these brief notes of the case exhibits a deformity closely resembling the hand in the case of McGillivray (No. 30, Fig. 23) and the case of Friedberg (No. 48, Fig. 32). He does not state whether congenital or acquired.

[2] W. Petters.

while increased in number, and that the left labium majus had become enlarged. Another physician was consulted, who first applied the tincture of iodine, and finally cauterized with nitrate of silver. This was at once followed by severe pains in the lower abdomen, so that the patient could hardly reach home. The discharge ceased. Patient was obliged to go to bed; had fever, thirst, and a feeling of internal heat; fainted repeatedly on account of pain. This condition continued for fourteen days; after this she recovered, and as for eight weeks the discharge failed to return, she was married December 22, 1871, one year after the beginning of the sickness. During the wedding night her husband (according to his own confession) was struck by the fact that the left labium was larger than the right. Coitus daily during the first period of married life, afterwards less frequent, and ordinarily only twice a week, always led to copious efflux of a whitish fluid. About two months after the marriage, patient placed herself in charge of a surgeon, who ordered three sitz-baths daily and a white ointment, after which treatment the discharge again ceased for eight weeks. Meanwhile patient became pregnant, and the white discharge ceased altogether. During pregnancy she frequently suffered from pain in the lumbar region and from abdominal irregularities. She aborted in the third month (February, 1872), after having endeavored to lift a heavy weight. The abortion was followed by peritonitis of the right side of three months' duration. With this there appeared in the right inguinal region a tumor of the size of a pigeon's egg, which, however, gave no trouble and gradually disappeared. During convalescence the milky discharge reappeared.[1] When the discharge was about to be checked the nipples became erect and the mammæ more tense.

Another surgeon ordered baths of oak-bark, and iron internally. This treatment having failed after two months, the patient consulted still another physician, who ordered a powder to be applied locally, which caused severe pain, but brought no amelioration. The discharge gradually increased in quantity and frequency, and the patient now consulted Dr. Weiss, of Prague, who treated her for some time as an out-patient. At this time she is said to have

[1] "In many discharges looked upon as milk-secretion by the older physicians, there may have been a mistake of lymph for milk. Thus, the milk-sweat observed by Dr. Storch in a woman aged thirty, parturient for the fifth time, which continued for eleven days, and was accompanied by milky lochia, was very likely only a lymphorrhagia."—Petters, *loc cit.*

Buchanan, "in a case of lymphorrhagia in a woman aged forty-six, in whom the lymph exudation took place from vesicles upon the left thigh, as represented in the accompanying figure, and who, during the period of the lymph discharge, lasting fifteen years, had passed through two pregnancies, always accompanied by cessation of the lymphorrhagia, saw, during occasional cessation of the lymph discharge, a swelling of the breasts with a feeling of fulness and tension, and once even milk-secretion." (See Fig. 56.)—Med.-Chir. Trans., Vol. LXVI., p. 57, 1863, Lond.

looked well, and there also was a striking increase in the size of the left thigh. Dr. Weiss, who ordered tinct. gallæ and iodine externally, and at first was willing to remove part of the labium, stated that upon one occasion he saw lymph in a jet flow from a pinhead-like opening of the labium. He, however, was unable to enter it to any distance with a bristle. He recommended her to go to hospital,

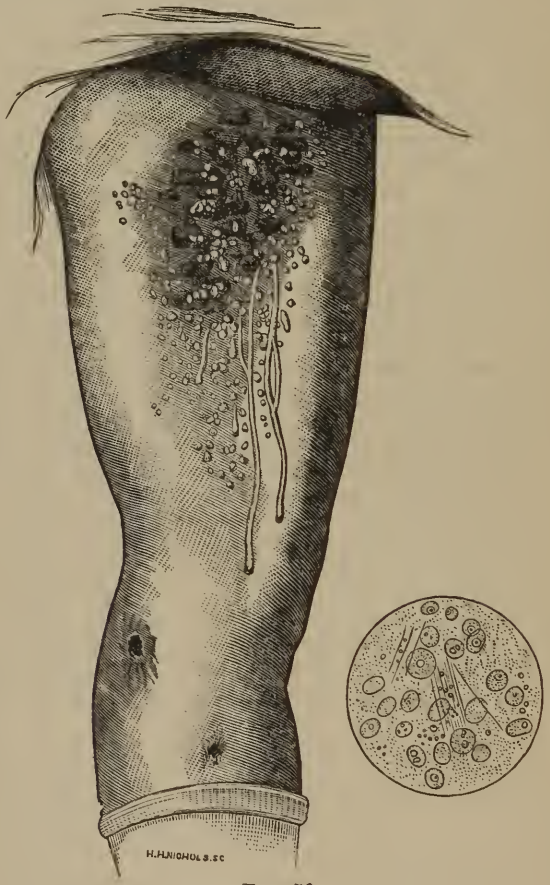


FIG. 56.

which she entered April 28th, after I had, on the day previous, made the diagnosis of lymphorrhagia and lymphangiectasis.

The patient subsequently stated that the left thigh had become more strikingly enlarged during the cessation of the discharge; that at the time of the flow she also felt herself getting thinner and losing strength. Questioned as to the cause of her local affection,

she remembered that once one of her sisters, with whom she lay in bed, had pulled a few hairs out of the left labium; this very likely had no influence upon the origin of her disease.

Condition, April 27th: patient looks older than she is (like a woman of thirty); body medium; skin delicate; panniculus adiposus moderately developed; mammæ small, but solid; nipples well developed; muscular tissue thin and flaccid; a few freckles on face; eyes brown, expressive; cheeks not reddened; visible mucous membrane red; tongue moist, clean; neck long; thyroid gland small. Elevation of thorax occurs regularly; right thoracic half slightly more rounded than the left. No venous dilatation upon neck or thorax. Cardiac impulse feeble in the fifth intercostal space, between left edge of sternum and the nipple. Percussion sound clear and feeble, extending to the upper edge of fourth rib upon the left, and to the upper edge of the seventh rib on the right side. Cardiac dulness measures 5 ctms. square. Respiratory murmur feebly vesicular in inspiration, ill-defined in expiration. Heart-sounds normal, without bruit. Pulse rather full, 76 per minute. Abdomen retracted; hepatic dulness extends to about 3 ctms. below the costal arch, and to the middle line. Spleen not enlarged. Left half of mons veneris, containing a thick fat cushion, projects beyond the right. Left thigh strikingly enlarged; measurements: under pubic arch, 51 ctms. (right, 47.5); in the middle of thigh, 44 (right, 42); above condyles of knee-joint, 33.5 (right, 33.5). Whilst the right inguinal glands are mostly as large as beans and hazel-nuts, those on the left, above as well as below Poupart's ligament, are of the size of horse-chestnuts, so that the left inguinal region predominates; below the integument the touch discovers an irregular resisting mass—the greatly enlarged glands crowding each other. Left labium projects to the size of a pigeon's egg, is pale red, irregular, and covered with numerous nodules of rather firm consistency, some showing small centre depressions. The epidermis over the nodules seems somewhat less attached, but not quite loosened. The consistency of the labium is that of a connective-tissue stroma. The labium is somewhat sensitive to pressure, but the latter does not force out fluid. Nymphæ small, covered entirely by the labium; upon the external portion of the left, a small nodule, like those described. Mucous membrane of vulva and vagina roseate. The speculum showed slight chronic leucorrhea, and the sound a moderate retroversion and deviation to the right. Inspection of back shows nothing abnormal. Weight of body, 84 lbs. (in 1873 the weight was 98 lbs.). General health good; appetite ditto; bowels open every third day. The last menses continued, as usual, for three days, and in April occurred twice. On the forenoon following her admission the discharge reappeared, and it was seen that the labium became more tense, and that at several places, without visible lesion of the skin, minute milky drops exuded, which, after being enlarged, rolled off. The dried remains of these drops formed a yellowish white scab. About 50 grms. of a

yellowish white, rather thin fluid was collected, which deposited a white, rosy reddish, soft coagulum of about the size of a bean—fluid alkaline; contained sodium albuminates, no sugar, no urea, and, under the microscope, red blood-corpuscles and numerous lymph-corpuscles, with free fat, but no epithelium. Rennet produced no coagulum; this excluded the presence of casein. Urine faintly acid; specific gravity 1.08; yellow, and contained but few chlorides.

Treatment.—She was advised to walk as little as possible; to have a warm sitz-bath three times a day; diet full; quin. sulph. 0.072 grms. morning and night. April 28th: no discharge. 29th: grms. 18 of a similar fluid collected and presented to Prof. Klebs for examination. It contained fat, red blood-corpuscles, and no other formed elements. April 30th: 105 grms. examined by Prof. Klebs. The fluid contained a coagulum more than one-half of its bulk; it was loose and transparent; besides fat and red blood-corpuscles, there were numerous lymph-corpuscles. Urine free from albumen. May 1st: 180 grms. collected. Temp. of body—A.M., 37° C.; P.M., 39.9° C. Pulse—A.M., 72; P.M., 76. May 2d: 80 grms. collected. May 3d: 70 grms. collected. 4th: 105 grms. collected, A.M.; spec. grav. 1.0190. 5th: 75 grms. in one and one-half hours. The several examinations resulted similarly, thus confirming the diagnosis.

Results of Analysis.

Analysis 1st. Weight of lymph, 18.62375.

Water	17.20000	Per cent. water	92.36
Carbon compounds	1.28200	" carbon compounds	6.88
Ashes	0.14175	" ashes	0.76
	18.62375		100.00

Analysis 2d. Weight of lymph, 71.890000.

Albuminates	3.59875	Per cent. albuminates	5.00
Extractive	0.56675	" "	0.78
Ether extracts (fats, etc.)	2.33625	" "	3.06
Salts insoluble in water	0.06300	" salts insoluble	0.09
" soluble "	0.43175	" " soluble	0.61
Water	64.89350	" water	90.27
	71.89000		100.00

The fats consisted principally of glycerine, compounds of stearic and paluric acid, slight quantities of oleic acid and volatile fatty acids. Cholesterine could not be demonstrated. Ashes contained principally sodium, lime, magnesia, traces of potassium and iron. Hydrochloric, phosphoric, and sulphuric acids were present.

Prof. Petters concludes that there must have existed dilatation of lymph-vessels; but he did not think it probable that

the ectasia had advanced as far as the labium. He inclines to the view that the lymph in these regions, after having passed through the vascular walls, penetrated through hyperplastic integumentary tissue like through the pores of a filter, pressure upon the lymph reservoirs being the cause of the discharge.

The increased discharge during coitus is ascribed partly to the above and partly to nerve influence, Krause having proved that in dogs irritation of sensory nerves increases lymph secretion.

Cessation of the flow during pregnancy is explained (Petters) by the fact that the lymph is withdrawn from the reservoirs because needed elsewhere, and because the latter are compressed by the gravid uterus. Menstruation appears to have had no influence.

The ectasiæ were situated in the inguinal regions and below, and were also supposed to be in the true pelvis. The question whether the affection started from obliteration, atrophy, or other disease of the lymph-vessels, could not be determined.

Prognosis unfavorable. The efflux must lead to waste, and the hypertrophy, if increasing, to elephantiasis.

Therapeusis, after a review of the recorded cases, was regarded by Petters as offering no hopes, and therefore treatment was limited to bandaging the left extremity from the toes to the hip.

May 6th: 1,408 grms. collected; 71.89 grms. discharged in ten minutes. Menses at night.

May 7th: discharge less; 71.89 grms. in 32 minutes. Pain in abdomen and back. No stool. Urine—spec. grav. 1.010; containing epithelium, blood-corpuscles, and vibriones.

May 8th: menses scant; bowels moved; pain subsided; discharge ceased.

May 9th: no discharge. Menses ceased at 8 P.M.

May 10th: no discharge during the day; it reappeared towards night; 9 grms. collected.

May 11th.—The discharge reappeared P.M.; 35 grms. collected in 85 minutes.

May 12th.—Copious discharge about 3 P.M.; 35 grms. were collected in 30 minutes, and during the evening 49.7 grms. in 45 minutes.

May 13th.—From 8.45 A.M. to 9.15, 30 grms. collected. Had two stools in quick succession.

May 14th.—Between 7 and 8 A.M., 59.1 grms. collected, and between 11 and 11.30, 52.9 grms. of lymph discharged.

May 15th.—50.5 grms. in 55 minutes. Patient weighed 48.55 kg., *i.e.*, 0.91 more than on April 26th. General condition good. She became more animated and hopeful. But a different condition supervened. P.M., she had pain in the lumbar region and tearing pains in both lower extremities. Lassitude, fever, loss of appetite, and several red spots appeared upon the thigh, corresponding to the lymph glandular tumor. When she endeavored to rise about 6 P.M., she was overcome by such weakness that she nearly fainted. Thirst and heat increased, and she felt unusually weak. Lymph discharge ceased.

May 16th.—Appearance bad, great thirst, no appetite. Integument of inner surface of left thigh down to the condyles of the knee-joint, of the external surface to the lower third, mons veneris and region above left inguinal region, vividly reddened in stripes and sensitive. Glandular tumor and left labium somewhat swollen, the latter dry. No lymph discharge. Temperature in axilla 39.6, pulse 120. Temperature in erythematous portion of left thigh 39.1.

Lymphangitis had evidently supervened, as shown by fever, erythema, and cessation of the lymph discharge. Although the temperature of the affected portion appeared below the general temperature, yet it was considerably higher than the temperature of the other surfaces, and perhaps rarely surpassed that of the general organism, although the fact could not be proven by a thermometer, which, though sensitive, was not adapted to take the temperature of surfaces. Peritonitis set in finally, and the patient died May 22d.

Approximative estimate of the lymph discharge during her stay in the hospital, about 1,225 grms. During her sickness, not counting the occasional discharges, about 18,515 grms.

Sectio cadaveris by Prof. Klebs, 28 hours after death.

Body well formed; in the upper half very extensive, somewhat irregular, spotted, bluish discoloration of the skin, more regularly extended upon the dorsum, where we see numerous punctiform spots, in part somewhat raised, and among which we find here and there small ecchymoses in the upper layer of the integument. In one place are found larger prominences, about 2 mm. in size, containing in the centre a suppurative point. Similar ones are found in the upper cervical region, more ecchymoses in the sacral region. The anterior aspect of the lower extremities shows only a pale, brownish blue discoloration in stripes; face on left side strongly cyanotic and swelled; conjunctivæ bulbi very pale.

Skull rather regularly formed, large, wide; diploic substance well preserved; thickness moderate; upon the inner surface a slight hyperostosis, with higher developed vessels. In the longitudinal sinus a long blood-clot with fibrinous deposit.

Dura mater hyperæmic, tense; inner surface moist; vessels of inner surface of dura irregularly filled; upper gyri little flattened, more on the left than on the right side; vessels in general copiously filled with

blood. Beneath the tentorium a little clear fluid, in the sinus basilaris a copious amount of dark fluid blood. Pia mater delicate, its vessels filled. Lateral ventricles not dilated. Cerebrum flabby, tolerably well infiltrated; vessels of the white substance of the left side filled with fluid, partly with coagulated blood; substance generally pale, only here and there greater capillary fulness. Cerebellum strongly infiltrated by serum. Cortical substance intensely reddened, as also pons and medulla oblongata.

Abdomen puffed up, moderately tense; subcutaneous connective tissue well developed, fat of a bright yellow color; subserous fat well developed. From the abdominal cavity flows a considerable quantity of thin, greenish yellow fluid; in it floats a number of bright yellow floculi. Muscular substance everywhere well developed, infiltrated throughout, brown red. Towards the mons veneris the fat cushion increases greatly. The skin is strong, filled with numerous ecchymoses. Left labium much swollen, tough; mucosa cyanotic; surface covered by a large number of small ecchymoses and partly also nodular prominences, some of which have a yellow scab, others presenting the impression of vesicles filled with fluid. Towards the inguinal region we can trace in the adipose tissue a great number of moderately enlarged lymph-glands, very strongly reddened, in places filled with ecchymoses. The whole tissue is saturated by a clear, watery fluid; from the single glands we can trace tortuous lymph-vessels and blood-colored strands. Towards the surface of the labia the tissue assumes a dense, more fibrous character, and the fat-lobules disappear. Diaphragm high, on right side up to the third, on the left up to the fourth rib. Lungs somewhat retracted, slightly pigmented, pale; pleural cavities free; pericardium contains some fluid. Heart of moderate size, diffusely tinged by the coloring matter of the blood along the veins of the right side, also across the right auricle; right side strongly contracted, fatty upon the surface; in the left little blood, right heart tolerably full; auricle contains a large fibrinous coagulum, as well as the ventricle; heart-muscles pale brown, rather well developed; valves slightly reddened by imbibition, delicate; on the left side slight coagulum and little imbibition of valves. In endocardium of left ventricle numerous bluish places, showing, however, no hemorrhagic character. Left lung large, bluish on surface, pleuræ filled with numerous bluish and dark brown ecchymoses, apparently let into the pulmonary parenchyma. Œdema and hyperæmia of lung-substance, which everywhere contains air. Bronchi contain a frothy, watery fluid; walls delicate, somewhat hyperæmic; right lung somewhat larger than left, strongly œdematous and hyperæmic; in the lower lobe somewhat less hyperæmic. Air everywhere. Omentum extensive, fatty, covers intestines completely; in the true pelvis everywhere firmly attached to peritoneum of anterior and lateral wall; intestines meteoristic; parietal peritoneum shows strong capillary coloration, and is covered by fibro-purulent masses of loose consistency.

In right inguinal region glands greatly swelled and reddened, on

left side the largest; an extensive mass of tumors, measuring 7½ ctms. along the inguinal fold, and 4½ ctms. vertically. Upon top we distinguish upon section a cortical layer 1½ ctm. in thickness, consisting of a homogeneous, dense, grayish red mass; within this layer we find only a few caverns with smooth walls 1–3 ctms. wide, anastomosing partly with each other. About the middle, one of the caverns extends to the surface of the cortex surrounded by a crown of smooth-walled caverns, communicating frequently with each other and having a diameter of from 5 to 10 mm. Towards the hilus they pass into tortuous canals which accompany the blood-vessels. Farther down are found somewhat less enlarged, simply reddened, dense lymph-glands; one of which, measuring 4 by 2 ctms., consists of a soft brown-red and moist tissue, but shows in the centre minute spherical caverns and thinned walled canals ½ mm. wide. In the caverns of the larger glands is found a thin, slightly red fluid, and reddish fibrin-coagula not quite filling the lumen. Vena saphena passes parallel with the lymph-vessels of the large glands; it is collapsed. Small branches may be traced by the probe into the lymph glandular substance, without showing a communication with the caverns.

Subserosa in left iliac fossa, and along the ureters œdematous. Above the enlarged glands, between the latter and the fascia lata, we enter wide smooth-walled caverns, numerously partitioned by thin trabeculæ and communicating by openings into each other. Such a branch passes under Poupart's ligament in the direction of the great vascular trunks, divides here into two branches, one of which passes to the left into the iliac fossa, soon to turn and reach the region of the large vessels; here it appears to end, about 6 ctms. above Poupart's ligament, on a level with the promontory, 7 ctms. below upper edge of psoas, upon its lateral surface; whilst the second branch can be traced into the depths of the true pelvis. Here also the caverns contain but little clear fluid, only a few of the wider recesses contain slightly reddish fluid and small coagula. Spleen somewhat enlarged, 13 ctms. long, 8 wide, 3½ thick, covered on surface with fibrin masses; substance flabby but tough, reddish brown. Left kidney covered by a copious layer of fat, rather large, capsule easily separated, flaccid, tissue strong, surface pale yellow, large vessels hyperæmic, showing net-like arrangement; medullary cones moderately reddened. Stomach of moderate size; mucosa pale, with little mucus, tinged with bile, somewhat macerated, slightly opaque in general. Intestinal wall somewhat thickened; on small intestine a large mass of pale yellow, tough contents. In large intestine masses somewhat consistent, also yellow in color, entire mucosa pale. No other important changes. Liver somewhat enlarged, covered by fibrin masses, mostly upon right lobe, the latter 10 ctms. wide, left 10 ctms., height of right lobe 15, spotted red, here and there a few dark ecchymoses. Parenchyma regularly brownish yellow; here and there centre of lobules more strongly reddened, substance of parenchyma has a dull, opaque appearance.

Lumbar lymph-glands natural in size; but on the left side, behind

one of the glands, is found a moderately large lymph-cavern alike in character with those of the left inguinal region. Lymph-vessels can be traced to the diaphragm, decreasing in size. Thoracic duct normal in dimensions, 6 mm. in circumference above diaphragm, somewhat narrow above.

In the pelvis all the parts are grown together by connective-tissue masses; within the adhesions vesicular cavities filled with clear yellow fluid, are found.

Vagina of moderate width, rugæ large, mucosa cyanotic, uterus small, fundus turned to the right, neck straight, cavity measures 6.2 ctms., 2.5 of which belong to the neck. Walls pale, of moderate thickness, dense. Appendages grown to each other and to the adjacent viscera and parts by loose connective-tissue masses, which, besides larger œdematous cavities filled with a clear fluid, contain a series of greater and smaller intercommunicating caverns, filled with pus, and from their connection with the uterus prove to be the dilated tubes. Its walls are very thin, easily torn, and covered by soft yellowish masses. Remains of ovary not demonstrated with certainty by macroscopic inspection. Upon left side also intimate union of appendages. Between the sigmoid flexure and the uterine appendages, viz., the tube and inner surface of the uterus, lies a tumor of apple size, having a jelly-like feel, and measuring 6 ctms. transversely, by 4 ctms. antero-posteriorly. Upon section it is found to consist mostly of gelatinous substance, of a gray-reddish color, and surmounted by a strong albuginea 1 mm. in thickness. In the substance of the left ovary are imbedded several foci of spheroidal form of cherry-kernel size, more dense than their surroundings, of yellowish color (inspissated pus), which reminds one of that of the tubular contents of the opposite side.

This instructive case presents, in its insidious inception, continuous progress, intermittent discharge of lymph, fatty developments and other concomitant phenomena, the typical history and course of cases of lymphorrhagia. Beginning in the formation of a white papilla upon the left labium majus, which, having been pricked, exuded a white fluid; it attracted but little attention until a number of vesicles appeared, accompanied with enlargement of the labium. Subsequently the inguinal glands became swelled and soon the left thigh began to increase rapidly. The impediment to the lymph-stream and stasis of the fluid were manifested by the recurring discharges and progressive hypertrophy of the parts within the area of the lymphangiectasis. Prior to the dribbling of a few drops of the whitish fluid from the ruptured vesicles the obstruction to the lymph-stream must have occurred, and the subsequent post-mortem examination locates the obstacle in the enlarged and impervi-

ous inguinal ganglia of lymph-glands. In this particular the case differs from Case 1, inasmuch as in the latter case the impediment was located in the devastated retroperitoneal glands. The frequent recurrences of the discharge relieved the lymph-stasis, and while the loss of fluid seriously affected the patient's constitutional vigor, it obviously retarded the local hypertrophy; yet this was sufficiently marked to illustrate the effect of lymph-stasis in producing increase of the adipose tissue. The post-mortem examination disclosed a greatly increased fat cushion in the neighborhood of the mons veneris and in the left labium majus. The surface of the latter was covered with a number of vesicles filled with fluid, its structure was saturated with a watery fluid, and tortuous lymph-vessels could be traced in the direction of the enlarged and impervious inguinal glands.

In this case, as in similar cases, the enlargement of the left thigh was more striking during the cessation of the discharge, obviously because the fluid was retained in the part, in consequence of the interruption to the ordinary course of the lymph-stream. This enlargement was mainly due to the increase of the panniculus adiposus, and in this particular the case verifies the general law which I have endeavored to set forth, that retention of lymph in any circumscribed area will be followed by hypertrophy of the fat-tissue. In the integument, especially towards its surface, where the tissue was saturated by a clear watery fluid, it assumed a "dense, more fibrous character, and the fat-lobes" disappeared. The watery fluid which infiltrated the skin occupying the "lymphatic radicles," and spaces within the tissues, was either transuded blood-serum, or lymph qualitatively altered, impoverished, and poor in its "essential and constant elements," and, as has been shown in a number of cases previously cited, was directly associated with proliferation and condensation of connective tissue.

The patient of Petters, as was the case with all the instances of lymphorrhagia, with the single exception of the youth seen by Demarquay, lost flesh and strength during the flow; and, generally, so great was the physical exhaustion and rapid waste that the sufferer was compelled to seek relief from the attending distress and discomfort, in bed, until by rest, tonics, and a nutritious diet, health was restored, not, as a rule, however, up to the standard at which it was prior to the discharge, so that

after every recurring loss of lymph, the constitutional vigor of the patient was manifestly depreciated, until, finally, debility became the marked and predominant characteristic of the affection. During pregnancy and lactation, though the cases are too few to admit of any general conclusion, the discharges of lymph, as a rule, ceased to recur when these intercurrent conditions had terminated. The facts, nevertheless, point to some demand upon or consumption of the lymph during the existence of either of these physiological conditions, and indicate, at least in regard to the female sex, that lymph is something more than a vehicle for the conveyance back to the general circulation of the superabundant material of nutrition and the products of the waste and interchange of the tissues which is constantly taking place in the animal economy. Whilst the cessation of lymphorrhagic discharges during pregnancy and lactation has been uniform, it does not appear that menstruation has so constantly borne a like relationship to the accumulation and consumption of the lymph. On the contrary, in several of the cases of lymph-tumors involving the female genitalia (see cases of Bryk and Chadwick), the lymphatic developments augmented with every recurring catamenial period. In explanation of this circumstance we may invoke the differing relation which pregnancy and lactation, and menstruation bear to the economies of the female constitution. Pregnancy and lactation involve the nutritive processes and make heavy demands upon the assimilative functions. They are consumers of material and call into active operation the processes of preparation and elaboration of nutriment, which, in those neither pregnant nor nursing, would be adapted to their physiological wants, or, perhaps, superabundant, but would be unfitted either for the fœtus or the nursling. The menstrual hemorrhage is practically a loss, but accompanied with a turgescence, an afflux of blood to the genital organs, conveying an excess of plasma, and supplying additional material. It may, then, be entirely consonant with the laws of nutrition that lymph-tumors involving the female genitalia should develop more rapidly during the continuance of the menstrual turgescence of the parts.

Lebert[1] has invited special attention to a form of anæmia

[1] Archiv. Général de Med., April, 1876. Also Month. Abst. Med. Sci., Vol. III., p. 389.

produced by an excessive flow of lymph, which he classifies among the spoliative anæmias, signifying "a consumption of the elements of the blood more rapid than their production." The symptoms of lymphorrhagic anæmia (Lebert) "are analogous to those produced by hemorrhage[1]—especially hemorrhage from the uterus." The cases of Fetzer, Day, Petters (No. 88), Buchanan, Desjardins, and Roberts supply illustrations of this variety. The losses of lymph in such cases usually consist of discharges recurring at irregular intervals, sometimes in small quantities daily for several consecutive days, and at other times in large quantities after long intermissions. Fetzer's patient lost in one continuous flow 57 oz., and in the case of Desjardins the lymphorrhagia frequently continued for ten or twelve hours, and on one occasion for forty-eight hours, and the quantity evacuated per hour was 120 grammes.

The immediate effect of the loss of lymph is upon the constitution of the blood, diminishing the number of red blood-corpuscles and quantity of albumen, alterations analagous to those which occur during pregnancy and lactation. There is also lessening of the quantity of blood, an effect opposite to that which takes place during pregnancy, but the same as follows hemorrhage. Another analogy between the condition existing during pregnancy and that caused by lymphorrhagia and lymphangiectasis is exhibited in the tendency to stases of blood.

The case of Petters (No. 88) exhibits also the tendency, which attaches as well to the cases of lymphangiectasis as to those of lymphorrhagia, to frequently-recurring attacks of inflammatory processes of an erysipelatous or elephantoid character. This predisposition is not so universal among the congenital as among the acquired forms, due, undoubtedly, to the fact that in the former the affection frequently finds its cause in some defect of formation of some part of the lymphatic apparatus, whereas in the acquired forms the immediate cause is generally traceable to structural changes produced by previous inflammation, traumatism, or thrombosis. There is no doubt that among the congenital cases malformation is the

[1] "It has also happened many times, that, when these lymphorrhagias had ceased for some time, the patients complained of great uneasiness, a sort of lymphatic plethora, which caused them to open the varices," Lebert, Traité d'Anat. Patholog. gén. et spé., p. 548.

most frequent cause; yet it is not improbable, as has been previously suggested, that morbid processes taking place during intra-uterine life have likewise produced the various forms of occlusion, dilatation, and narrowing of lymph channels, and it is probable that the inflammatory processes which subsequently during extra-uterine life invaded the affected parts were merely recurrences of similar morbid conditions which had attacked the parts prior to birth. However different the morbid processes may have been in the congenital and acquired forms, the structural alterations of the parts involved have been the same, producing hypertrophy and condensation of the tissues. Quincke insists that inflammation and lymph-thrombosis are the pathological processes which usually cause circumscribed narrowing or complete occlusion of lymph-channels. These conditions may be produced by thickening of the coats of the vessels, adhesion of their internal surfaces, fibroid transformation of their coats, calcification of their coats, or of a thrombus, lodgment of particles of cancerous or tuberculous matter in the vessels, compression from cicatrices, induration of surrounding connective tissue, tumors, diseased glands, stasis of blood in large veins, cardiac diseases, excessive exercise of function, paralysis of the vessels, and mechanical obstruction to the lymph-stream, and "within the area from which the narrowed or occluded vessel originates there is lymph-stasis, dilatation of truncal vessels, and œdema of the tissues."

In a large majority of the cases of lymphangiectasis and of lymphorrhagia the fluid which either accumulated in the affected area or was emitted through the ruptured or incised orifices presented the physical characteristics and appearance of chyle, due to the quantity of fat it contained. In a few cases the fluid which was at first discharged, or which was collected in the vesicular formations, was serous and gradually changed into a chylous or milk-like fluid. In several instances this change in the color seemed to be immediately connected with the digestion and assimilation of food. In Roberts' case the vesicles which thickly studded the abdomen varied "in color and fulness. The whiter the more distended, and when pale they were flaccid. The color was also affected by the state of the patient's health, and by the digestion and assimilation of food; when feverish they were pale, but when the appetite and

sleep returned they became milky and turgid. As his health finally declined, the milky appearance became less marked, and in the last week of his life they became permanently pale and flaccid. They were paler in the morning before breakfast, after the prolonged fast of the night. Soon after breakfast they began to grow fuller and whiter, which increased through the day and attained its maximum about eight hours after dinner. The discharge followed the same rule." This case exhibits also the effect of exhaustive and febrile conditions upon the quantity, opacity, and color of the flow, and illustrates the spoliative influence of starvation and fever, agencies which Lebert enumerates among those which consume the red blood-corpuscles and lymph. But whilst the various changes in the chemical constitution of the fluid exuded in the case observed by Roberts may be thus accounted for, the explanation is not applicable to very many of the cases, for, in a large majority, fever was absent and the ingestion of food was without observable effect upon the chemical constitution and physical characteristics of the discharged lymph. Various hypotheses have been offered in explanation of the changes which take place in the lymph in cases of lymphangiectasis and lymphorrhagia, but all are unsatisfactory. The alterations consist chiefly in an increased proportion of fibrin, the addition of numerous cell-elements, not unlike endothelial cells, white, and occasionally red blood-corpuscles, lymphoid cells, granular matter, a varying quantity of albumen and fat, which, in a measure, must owe their presence to pathological processes affecting the intima vasorum, and to transformation of the inflammatory products and of the cell-elements of the diseased vessels.[1]

In view then of the considerations which relate to the lymph and lymphatic apparatus and the devastating influences of the morbid conditions upon the general constitution, it is not surprising that so many of the cases eventuated in the development of pulmonary tuberculosis. In explanation of this manifest connection between the diseases of the lymph channels and tubercle, we may either accept the theory of auto-

[1] To avoid repetition I must refer the reader, for a discussion of these hypotheses, to my essay on occlusion and dilatation of lymph channels, published in the N. O. Med. and Surg. Jour., July, 1877.

infection or invoke the aid of anæmia, blood impoverishment, exhaustion from loss and consumption of red blood-corpuscles, or the histological identity of the tissues affected in the primary disease of the lymph channels and subsequent tuberculosis.

GENERAL REMARKS.

No systematic classification has been attempted in the arrangement of the foregoing collection of cases. The paramount consideration has been to study the subject in its clinical aspects, and the cases have been introduced as might seem best to facilitate this course of study. If the discussion had been limited to the consideration of the congenital lymphangiomas, the following classification of Wegner[1] would have probably simplified the subject.

He divides the lymphangiomas of Virchow into three classes, as follows:

I. Lymphangioma Simplex, consisting of lymph spaces and capillaries forming an anastomozing net-work. He illustrates this variety mainly by cases of macroglossia, citing the cases of Maas, and one observed by himself in a child one year old, in which the disease appeared soon after birth. To this class probably belong all the cases of congenital macroglossia and macrochilia, except such as Billroth insists consist exclusively of a fibroid development, and those which Weber maintains are merely an hypertrophy of the muscular tissue, having its beginning in some obscure inflammatory process.

II. Lymphangioma Cavernosum, consisting of a trabecula of connective tissue enclosing cavities filled with lymph. He has had the opportunity of observing four such cases; one in the breast of a nine-months infant; one in the supraclavicular region of a man of twenty-five; another on the forehead of a child, and the fourth on the back of a child. To this class many of the cases previously cited belong, which the reader will readily recognize from the accompanying descriptions. The structure and the various theories regarding the formation of

[1] Ueber Lymphangiome, Arch. f. Clin. Chir. 1877, xx., p. 641.

this variety of lymphangiomata have, it is believed, been sufficiently set forth.

III. Lymphangioma Cystoides, consisting apparently of a collection of cysts, which are, however, not true cysts, but lymph spaces. This is manifestly a subdivision of the second form. To this group Wegner attaches the cases of cystic hydroma.

This classification includes only those tumorous formations which involve a cavernous or cystic transformation of the lymph spaces or lymph capillaries, and would exclude the cases of ectasia, which have for convenience been divided into three forms—cylindrical, moniliform, and ampullar.

The etiology of these affections is involved in great obscurity. To attribute them to congenital defect of formation is simply the expression of a fact, without offering a satisfactory explanation. That very many of the cases find their cause in nutritive disturbances and changes taking place during intra-uterine life is undoubtedly true. Chief among these factors is inflammation. In elephantiasis arabum the inflammatory process, which sets up the proliferation of tissue through stasis of lymph, does not continue uninterruptedly, but usually intermits, leaving a condition or acquired disposition, consisting in tissue changes already effected, and the consequent excessive supply or stagnation of the nutrient fluid or the lessening of the capacity of the effluent vessels. It is not improbable that similar disturbances may occur during intra-uterine life. One author has suggested the existence of a peculiar diathetic condition, which may be either connate or acquired, to which hypothesis the recognized factor of heredity offers support. They are undoubtedly connected with the strumous and tuberculous predispositions, either as cause or effect. Climatic influences in producing elephantiasis arabum are very generally accepted by writers on the subject, but their effect is not so manifest in the causation of this special class of affections of the lymphatic system. The influence of race and condition is much more marked. Much the largest proportion of cases have been reported by German authorities. Bryk has reported, of the congenital and acquired forms, twelve cases in his essay, and Manson has reported twenty or more cases of lymph scrotum which have occurred in his practice in China. Nearly all the cases collated in this memoir belong to that class of persons who rendezvous at hospi-

tals and dispensaries. The conclusion, therefore, is inevitable that blood impoverishment, a meagre diet, and bad hygiene are, at least, exciting agencies which call into active operation a pre-existing predisposition. These circumstances relate more especially to certain acquired forms, but a large number of those manifestly originating in some congenital abnormality are developed in after life, under influences which may be regarded as exciting causes. The age of puberty is regarded by several writers as the period of most prolific development. Maternal impressions, as was the case in the first observation recorded by the author, have been invoked in explanation of the phenomena by more than one reporter.

In view of the fact that defect of formation, due either to quantitative or qualitative disturbances of nutrition, is the predominant factor of causation, and the additional circumstance that in very many of the cases in which the affection was only recognized during the adolescent or adult age of the afflicted individual, the examination of the body after death disclosed conditions which could not have been acquired; the inference becomes more than problematical that defect of formation and morbid processes taking place during intra-uterine life constitute far more frequent causes than has been generally believed. In the cases which simulated hernia, in none of which was the condition of the lymph-vessels recognized until subsequent to the appearance of other symptoms locating the affection in the lymph system, it is more than probable that the congeries of twisted and dilated lymph-vessels which were mistaken for hernial tumors found their cause in defective formation. The same is probably true with regard to those cases, as illustrated by Cholmeley's case (No. 69, p. 101), in which obstructive cardiac circulation has been supposed to have occasioned the stasis of lymph. The rarity of this particular complication with these very frequent heart affections warrants the conclusion that in these special instances there was present some congenital defect, which awaited the operation of some acquired influence. The asymmetrical form in which these affections present themselves is an additional argument in support of this hypothesis. The ordinary anasarcous and œdematous conditions so frequently associated with heart troubles follow a very different law, and invade corresponding parts. So likewise must at least a por-

tion of those cases in which the stasis is remotely located from the obstruction to the lymph stream, more especially when located in the central trunk, be attributed to malformation of the vessels occupying the affected area. If not, why should there be any exception to the general rule of symmetrical ectasia of the lymph-vessels as exemplified in the case of Virchow (No. 59, p. 74), in which the obstruction to the lymph stream was occasioned by a thrombus in the external jugular vein? If this hypothesis is tenable, very many of the cases of lymphangiectasis ascribed to impermeable and devastated glands (which have been excluded from this memoir) would be properly classed among the congenital cases, for in very many of such cases the glandular affection could, probably, be traced to an inherited strumous diathesis, which would enhance the value of prophylaxis in the management of many cases.

TREATMENT.

The cases are necessarily divided into the curable and the incurable. To the latter class belong all those cases where the anatomical lesions are so located as to render positive diagnosis impossible, and those also where, though the diagnosis may be made with reasonable accuracy, the congenital defect is so situated or of such character as to forbid interference. In many of the cases the objective phenomena distinctly located the disease in the lymphatic apparatus, but the primary lesion was remotely located, and the treatment which might have, under more favorable conditions, been beneficial, was necessarily unavailing. In case 1, gradual and continuous compression of the hypertrophied limb might have stayed the progress of the development for a time, but no known plan of treatment could have restored the devastated retro-peritoneal glands, where the primary lesion was located, nor, if surgical interference had been admissible, could extirpation of the ganglia of diseased glands have contributed to the cure, or even arrested the progress of the hypertrophy. To have restored the limb to a healthy condition it would have been necessary to have removed all obstruction to the lymph stream. In those cases where the disease was mistaken for hernia, even though the

diagnosis, as made by Verneuil in Trélat's case, might have been accurately determined, obliteration or removal of the masses of dilated lymph-vessels could not have benefited the patient. On the contrary, any attempt to obviate the inconveniences which may be attributable to the morbid condition of the lymph-vessels, by surgical expedients, may, as happened in the cases of Trélat and Reichel, destroy or endanger the life of the patient. In certain cases treatment is not only futile, but hazardous. The danger of setting up inflammatory processes which exhibit a tendency to extend along the course of diseased lymph-vessels must not be overlooked.

The treatment is properly divided into local and constitutional. The constitutional treatment properly relates exclusively to the anæmia so constantly resulting from the losses of lymph, and to prophylactic measures to obviate the manifest tendency to the development of tuberculous affections. It is true that constitutional treatment has been instituted in a limited number of cases with the hope of securing favorable results. In the case of giant growth of the right leg (No. 48, p. 57) Friedberg fancied that his patient improved for a time during the employment of digitalis and dilute sulphuric acid, together with compression of the hand and forearm by wrapping with linen strips covered with mercurial ointment, over which cold compresses were applied. Subsequently he tried iodide of potassium and Karlsbad salts without any beneficial effect. The patient died of phthisis pulmonalis. In the case of lymphangiectasis (No. 52, p. 64) which was characterized by enlargement of the right lower extremity, beginning in the thigh and extending downwards, upon the surface of which were developed, in several places, numerous vesicles filled with a yellowish-white, opalescent fluid, Thilesen administered bitter tonics, but the patient died of general tuberculosis. In Day's case of enlargement of the leg (49, p. 61) with a milky discharge there was an apparent improvement for two years under the use of cardiac stimulants, warm clothing, frictions, the internal use of iron and other tonics, moderate exercise and recumbency when at rest. Mr. Maunder insisted that the hypertrophy was consequent on an undue supply of nutrient material, and that the indication was to diminish the supply either by compression or by ligation of the femoral artery.

Other observers essayed different methods of constitutional treatment, but all proved valueless, when such medication was addressed to the arrest or diminution of the local hypertrophies. A proper treatment by tonics, appropriate diet, and judicious hygiene is not without hope in delaying the development or staying the progress of tuberculous affections. The tendency to tubercle formations does not seem to have been recognized, the local disturbances of the lymph apparatus being generally regarded as entities in themselves, and though a few of the observers have essayed methods of treatment, consisting mainly in the employment of vegetable and chalybeate tonics, and, in one or more instances, of cod-liver oil, no one seems to have been impressed with the importance of those measures of prophylaxis, which are so generally deemed valuable as modifiers of the tendency to tuberculous developments.

The lymphatic anæmia, which Lebert classes among the spoliative forms, and which, with but a single exception, was the immediate effect of the lymphorrhagic discharges, which so frequently complicated these localized disturbances of the lymph vascular apparatus, was generally treated successfully with rest in the recumbent posture, a nutritious and easily digested diet, and tonics. Usually the discharge will cease after a few hours' duration, but occasionally interference becomes imperative, because of the copiousness of the loss, and the consequent impairment of the constitutional vigor. A compress applied firmly to the aperture, or cauterization with lunar caustic, has usually been sufficient to temporarily arrest the flow, but in a few instances these expedients have failed. Sometimes elevation of the affected limb has seemed to diminish the flow. Fetzer removed one of the wart-like growths from the abdomen of his case of peculiar disease of the lymph-vessels of the integument of the abdomen, and the discharge was so free and persistent that neither compresses, astringent solutions, nor cauterization with the nitrate of silver arrested it. He finally succeeded by painting the surface with a strong solution of the "lapis infernalis." Aime-David insists that caustics are only admissible when the lesion is limited to the plexuses of origin, and that the nitrate of silver is preferable to all others. He asserts that the radical cure of lymph fistulæ is very doubtful, and that lymphangitis, which is such a frequent

complication, and usually so rapidly fatal, is always to be apprehended from the use of caustics or other surgical expedients.

Carter treated a case unsuccessfully with large doses of gallic acid.

Roberts treated his case (No. 66, p. 82) "with the internal administration of styptics of various sorts, especially tannic acid, which was given in large doses. Locally, compression was attempted by means of long wide strips of adhesive plaster, but without any good effect. The discharge moistened and loosened the plaster, and the soft, yielding nature of the abdominal walls rendered impossible any effective compression by bandages or belts. Attempts were also made to varnish the surface with a solution of India-rubber in vinegar, and with collodion, but every device proved unavailing."

The ancients employed, without benefit, a great variety of topical applications in the treatment of lymphatic fistulæ. Muys, Nuck, Haller, Bell, and others secured fair results from caustics only after long continuance. Solingen employed with success direct compression, and in one case he practised with success scarification about the fistulæ, and the actual cautery. Ruysch first suggested compression below the aperture, which Kerkringius, Nuck, and Assalini tried with success. Bell employed compression, and proposed ligation of the vessels, which Binet insists would occasion rupture.

In the patient of M. Monod, compression was employed by bandages and diachylon plaster without favorable result. Cauterization was not attempted because of the proximity of the fistulous ulcer to the articulation, and the thinness of the soft parts separating the base of the ulcer from the osseous tissue. M. Monod, at the suggestion of Robin, circumscribed the fistula by two curved incisions, but failing to reach one of the lymph-vessels, which had emitted the fluid, only secured partial success, and was finally compelled to cauterize with nitrate of silver to cure a very small fistula. Ricord has successfully excised dilated and fistulous lymph-vessels. Binet remarks that for the success of the operation of excision it is necessary that the fistulous vessel be completely removed.

Methodical compression, says Binet, below the lesion, along the ruptured vessel, seems, when practicable, to be the best method of controlling old and recent discharges.

When unsuccessful, where permitted, deep and energetic cauterizations, he adds, may be employed to destroy a part of the altered vessel, or to produce local inflammation sufficiently intense to obliterate the fistulous orifice. Finally, he insists, if caustics are contra-indicated, recourse must be had to the incisions proposed by Monod and Robin. Compression cannot be practised without danger when the fistula is located in the lymph-vessels of the penis or scrotum, nor is cauterization considered safe. Excision has been successfully performed several times by Ricord.

The management of the frequently recurring attacks of erysipelatous inflammation, to which these affections are so liable, does not differ from the ordinary treatment of erysipelas.

The methods of treatment which have been adapted to the various forms of these affections, and which have yielded the most favorable results, belong properly to surgery, and may be classified under the separate headings, compression, puncture, injection, excision, amputation, and ligation of arteries. Under these separate headings, the different methods will be discussed.

Compression.—This is made by the application of a bandage, commencing at the extremity of the limb and enveloping the entire member, or, when one of the lower extremities is affected, by an elastic stocking. Sometimes compression may, with advantage, be combined with rest and elevation of the affected limb. It does not at best promise more than temporary benefit, and is not entirely free from danger. Unless it is equable over all parts of the affected limb it occasions much discomfort to the patient, and fails to effect any good, for the fluid will accumulate in the localities where least or no pressure is made. In at least two instances, cases 9 and 57, unfavorable results and death were attributed to this method.

Puncture.—This has been resorted to occasionally as a temporary expedient, and as a means of determining the nature of the accumulated fluid. In several instances the evacuation of the fluid from dilated vessels and cavernous tumors has been followed by collapse of the distended vessel and obliteration of the sac. In the case of lymphangioma cavernosum adnatum reported by Hofmokl (p. 112), the tumor collapsed after an exploratory puncture and the evacuation of its liquid contents. It had, however, completely refilled in six days. It was again punc-

tured, and soon afterwards erysipelas attacked the entire integument covering the tumor. This subsided in a week, leaving the tumor much smaller and presenting in places distinct hardness, probably caused by coagulation of the contents. Twenty-six days after the second puncture the tumor had diminished by two thirds its original size and was solid. In a somewhat similar case reported by Gjorgjewic (p. 114), incision of the tumor was followed by the establishment of a lymph fistula, which proved very intractable. The tumor, perhaps the size of a fist, of the cavernous variety, was situated upon the inner side of right thigh, below Poupart's ligament. Prof. Billroth, supposing it was a cold abscess, incised it, and was forced to the diagnosis of a cavernous lymph tumor. The lymphorrhœa continued uninterruptedly for a week or more, and then suddenly ceased, and immediately the tumor became tense, the inguinal region became reddened, hard, and painful; headache and vomiting occurred. Upon the subsidence of this condition the lymphorrhœa reappeared. Similar attacks recurred several times at short intervals, and always disappeared upon the re-establishment of the discharge. Finally a white deposit appeared upon the wound, which was scraped off and the entire wound cauterized with fuming nitric acid. The eschar separated on the seventh day, but a new deposit appeared, which was again removed, and the surface cauterized as before. Failing with the nitric acid, ineffectual efforts were successively made with carbolic acid, compression, piercings with the galvano-cautery, and repeated applications of creosote. Finally, to obtain a radical cure, the entire tumor was extirpated. In case 73 (p. 109), the tumor was punctured, but two days afterwards it was reproduced to the same extent as before; subsequently Broca emptied the tumor by puncturing, and then injected perchloride of iron, to set up adhesive inflammation. These means, combined with continuous pressure, seemed to be quite successful, for the tumor was not reproduced to the same extent, and remained stationary. In a third case, not unlike the two preceding, and denominated by Reichel (No. 76, p. 113) congenital lymphangioma cavernosum cysticum, consisting of a tumor the size of an infant's head, and extending "from the scrotum, attached to the left half of the perineum, to behind the anus." Reichel regarded the tumor as a cyst, and

punctured it with the view of evacuating its contents. Not more than twenty drops of a serous fluid escaped, after which nothing followed, in spite of pressure and kneading of the tumor. Subsequently, nearly every day for a month, he injected the tumor with either diluted or pure tincture of iodine, finally even chloroform, without obtaining even a trace of success. No inflammatory reaction followed. He then introduced threads, silk as well as cotton, which only excited a limited inflammation and suppuration. Finally, the tumor was removed by the galvano-caustic cutting noose. The child died "under symptoms of hydræmia and acute œdema pulmonum." In this connection the following case, reported by Ulmer,[1] is both interesting and instructive :

Mrs. A., æt. seventy, became rather suddenly affected about a year ago, without assignable cause, with a tumor upon the left scapula of nearly the size of a head, together with simultaneous œdematous swelling of the arm of the same side. She had covered this tumor for some time with a plaster, but it had constantly increased in size. I diagnosticated a lymph tumor forming on account of her age, a favorable prognosis, and began the following treatment.

Although I had no, or at least but very slight hope for absorption of the effused lymph, yet iodine would certainly pursue a different course of cure—inflammation, and evacuation of the lymph externally by maturation of the cavity. I therefore ordered friction of the tumor four times daily with ung. iodini, and at the same time friction with spir. Juniperi, ol. terebinth, and spir. ammon. fortior. into the arm. The first ounce of ung. iodini not producing any appreciable change in the tumor, it was repeated, and now the inflammatory process went on rapidly. The abscess pointed at the apex. I opened it with the lancet, evacuating a large stream of lymph, and thus the first act of the cure was completed.

The second act had for its object to re-establish the lost elasticity in the field of the tumor, to close the lymph-vessels, and finally to heal the wound. In order to attain this, a properly applied compress-bandage was necessary. At the same time I caused the highly inflamed integument in the area of the tumor to be dressed with a soothing liniment, in order to subdue inflammation, and after attaining this object, passed to injections of creosote (decoct. cortic quercus ℥ iv., kreosot. gtt. xx.), to be used twice daily. This limited the discharge of lymph to a considerable extent, but did not altogether silence it, as it had done in a few former cases. I however reached my object by a thorough cauterization of the wound with argent. nitr., which I permit to continue its effect for a quarter of an hour.

[1] Zeitschrift für Wundarzte und Geburtshelfer, vol. iii., p. 99.

The eschar having separated in a few days, I saw a clear ulcer, which healed easily. The œdema of the arm disappeared during the process of healing of the lymph tumor. Patient has been well ever since.

Puncture has been more frequently adopted in cases of dilatation of the subcutaneous lymph-vessels, especially when the varix was located about the penis. In Huguier's case, in which the lymph-vessels extending from the frænum to the root of the penis were dilated and tortuous, "a dull, almost colorless" fluid was evacuated by puncture, followed by immediate collapse of the vessel.

Several methods have been devised for the treatment of lymph varices involving the vessels of the penis. Ricord seized the knotted cord of the size of a crow's quill, which ran parallel to the median line of the raphé of the penis, with a pair of forceps, and excised the fold so formed, cutting with the bistoury all that was above the forceps, and then excised a part of the deep wall of the dilated vessel which remained at the bottom of the wound. The edges of the wound were brought together transversely, and secured by serres-fines. Union took place by first intention. In lymphatic varices of the prepuce Beau devised and applied successfully, in several cases, a different procedure. Simple puncture affords only temporary relief by evacuating the fluid which re-accumulates in a few days. The affection may be either intermittent, appearing after coitus and then, perhaps, gradually subsiding in a few days, or it passes into a state of "permanent continuity," and no longer disappears. In order "to obtain a good view of these varicosities, the folds of the prepuce must be obliterated by the drawing down and tension of the skin. It appears then in the form of a little rounded cord, perfectly transparent, of which the diameter varies from one to three millimetres, and which has the length of one to two centimetres."

"The lymphatic cord offers resistance and hardness to the finger." The accumulated fluid cannot, even by firm pressure, be expelled through either extremity, because of the competency of the valves, which divides the cord in its continuity into sections, marked by the locality of the valves. The dilated cord is confounded with the prepuce, and is divided into two extremities—a dorsal extremity, situated near the median line

of the back of the penis, and a frænal extremity, bordering upon the frænum of the prepuce.

The treatment of Beau varies according as the affection is intermittent or continuous. In the first case he employs with much success astringents and tonics, such as cold water, solutions of acetate of lead, alum, hydrochlorate of ammonia, etc., using them as lotions, especially as local baths. But when the varicosity has passed into the continuous stage, and has already existed for some time, these means are not efficacious, and others must be adopted to provoke adhesive inflammation of the walls of the dilated vessel and thus its obliteration. This he secures by the following operation:

After having caused the varicose cord to bulge out as much as possible by proper pressure, he passes an ordinary fine needle, armed with a thread, into the frænal extremity and along the vessel for a distance of a centimetre, then out through the wall of the vessel, and disengaging it from the thread, ties the two ends of the thread traversing the varix, and folding it up conceals it in the cul-de-sac of the prepuce which covers the glans penis. As soon as sufficient inflammatory action is set up, which usually occurs in three or four hours, and is determined by the presence of moderate pains and slight œdematous swelling of the prepuce at the frænal end, the thread is cut and carefully removed.

For several hours a serous effusion escapes through both apertures, the œdematous swelling of the prepuce disappears in a few days, leaving a decided prominence of that portion of the varicose cord traversed by the thread. It remains hard, slightly painful on pressure, becomes opaque, and gradually diminishes in size. In two or three months the vessel is so much reduced that it is lost in the mucous membrane of the prepuce. It is not necessary, insists Beau, that the thread should traverse the whole length of the varicose vessel, but it is essential that it be introduced through the frænal end, for as the movement of the lymph is from the frænal towards the dorsal extremity, it must follow that when the frænal extremity is obliterated, the efflux of lymph ceases, and the entire vessel diminishes in size, and entirely disappears, even before the disappearance of the other end.

The following case of "dilatation of the lymph-vessels of

the penis caused by stasis of lymph," reported by Friedriech,[1] exhibits these varices in a different etiological relation, and suggests a more conservative method of treatment when the cause can be definitely located in occluded neighboring and connecting glands:

K. K., journeyman cabinet-maker, aged eighteen, was admitted into the syphilitic division of the Julius Hospital on August 15th. He had a simple, not indurated chancre, about the size of a guilder (half dollar silver) upon the external skin of the penis, upon its lower side. It began to cicatrize in a short time, and left, even after completely healing, no appreciable puckering of the skin by cicatricial formation. After the ulcer had healed with the exception of an inconsiderable portion, swelling of the lymphatic glands began to be developed under rather severe pain in both inguinal regions, followed by turgescence and a painless swelling of the whole penis. At the same time was observed a vessel surrounding the corona glandis like a ring, having its beginning at both sides of the frænum, running thence upward in the furrow behind the corona glandis and continued above in a somewhat thicker second vessel, which extended upon the median line of the dorsum penis up to the root of the penis, but receded gradually inwards in its course, so that, the nearer it came to the root of the penis, it escaped more and more from view, and finally could only be discovered by the touch. These vessels were decidedly prominent above the surface, felt full, elastic, yet perfectly painless, and could be recognized as largely dilated lymph-vessels by their whey-like, dull white contents, as well as by their rosary-like arrangement. From the circular vessels surrounding the corona glandis radiated numerous thinner vessels, of about the calibre of knitting-needles, which carried the same contents, but, being dilated equally, did not present the same rosary-like arrangement, and which, receding after a short course upon the glands into the deeper tissue, soon escaped from view, so that no divisions or anastomoses could be observed. The two inguinal tumors were opened by the knife as soon as fluctuation was felt, and a considerable quantity of thin pus was discharged. Suppuration seemed to have principally taken place within the cellular tissue surrounding the glands, the infiltrated lymphatic glands protruding at the bottom of the opened abscesses in the form of nodular tumors of from filbert to walnut size, and of flesh-red color. The wounds, fomented with vin. aromatic. and laudanum, began to close in a relatively short space of time, the glandular tumors were resorbed, and *pari passu* with this the lymph-vessels were reduced to their normal lumen.

Amputation has been more frequently resorted to than any

[1] Verhandlungender Physicalisch-Medic nischen Gesellschaft, vol. ii., p. 319. Erlangen, 1852.

other surgical procedure. Enlarged digits and toes have been usually removed with success. This method of treatment has been applied to the tumorous formations, and generally to the cases of macrochilia and macroglossia. In several instances limbs have been amputated, and in a single instance, by Weir, of New York, the penis has been removed. Hecker failed in the case of Rosina Geng, because of the vascularity of the enormous tumor on the back, but subsequently succeeded in the partial removal of a tumor weighing thirty-two pounds from the buttock of Therese, the bastard daughter of Rosina. Czerny completed the removal by a second operation. The large tumors are generally very vascular, and great danger is incurred in consequence of the excessive hemorrhage, which is most frequently due to the abundant development of large, tortuous veins, with thickened coats, which do not collapse after division, and have to be ligated. Hecker encountered only two arteries, but was compelled to ligate over twenty veins. Better success has been secured by amputation with the galvano-cautery. Bryk has usually employed this method and with very remarkable success. See cases 5, 73, 79, and 80.

Excision has been usually practised in the cases of congenital macroglossia and macrochilia. In the case of Apollonia Hart, æt. two years, two punctures were made in the lower surface of the tongue, but the operation remaining without favorable results, a considerable piece of the organ was removed in the form of a blunt wedge. The hemorrhage was trifling, and recovery followed. Billroth removed the protruding mass in the case of Emil Luss, æt. seven months, by the écrasement linesaire, and no hemorrhage whatever occurred, either during or after the operation. The stump healed completely in the course of three weeks, and formed itself so favorably, that the tongue became rounded anteriorly, and the fact that an operation had been performed could scarcely be noticed. The child remained perfectly well from the date of the operation. He also excised so much of the upper lip, in the case of Carl Kosuk, as reduced it to the normal volume, and united the wound by sutures. The wound healed by granulation, and the patient was discharged completely cured. During the entire process of cure no new intumescence occurred, and the appearance was so normal that the fact of an operation having been

performed could not be discovered. These operations of excision in cases of macroglossia and macrochilia have not usually been accompanied with excessive hemorrhage, but in exceptional instances the loss of blood has been very great, in consequence of the venous dilatation. In such cases compression and sutures have to be resorted to to control the bleeding vessels.

Chadwick removed a lymphangioma fibrosum (No. 81, p. 119) by incising the vaginal wall and capsule, and then, with the handle of the scalpel, enucleated the tumor, nearly as large as a hen's egg. A second tumor was removed in a similar manner. A few ligatures were necessary. The lateral edges of the incision were brought together by silk sutures.

The ligation of arteries has been occasionally practised. Kappeler succeeded in reducing an hypertrophied lower extremity by ligation of the femoral artery. Bryk has performed the operation several times with varying success. In one instance he effected complete reduction of the tumor and return of the normal condition of the integument, but relapse began six months afterwards. In another case in which partial and stationary decrease of the tumor was effected by rest and elevation of the affected limb, a more considerable reduction was obtained by ligation of the femoral artery.

Mr. Maunder, in a communication to the *Medical Gazette and Times* (vol. i., 1869, p. 327), purporting to give his reflections upon the nature, cause, and treatment of the hypertrophy of one lower extremity (Dr. Day's case, No. 49, p 61), makes the following judicious and interesting suggestions in regard to the propriety and value of ligation of the femoral artery in such cases:

"Careful bandaging or the application of an elastic stocking will doubtless avail something towards checking the growth of the limb, but it may do so at the expense of the penis, either by increasing its growth or inducing constant chylous discharge from the open lymphatic vessels on that organ. Whatever the etiology of the complaint, whether obstructive, elective (the tissues having an abnormal appetite or affinity for food), or whether due to the existence of larger arteries, the indication is to diminish the supply of arterial blood with the hope of restoring the balance of the circulation. If the symptoms are

due to obstruction, the vis a tergo will be diminished, less nutriment will be carried to the limb, and then the tissues may be unable to appropriate the supply, and the surplus may cease. A similar result may probably follow if the cause be elective or due to excessive supply by arteries; the nutriment not being supplied cannot, of course, either be made use of or accumulate as at present, and the limb will not grow more rapidly than its fellow; and time and opportunity may thus be afforded to the sound limb to overtake the proportions of the unsound member, and thus, by the time the collateral circulation is established, the growth of the two extremities will proceed in harmony.

It appears that the hypertrophied parts correspond pretty closely to the distribution of the branches of the femoral and internal iliac arteries, and therefore, with a view to diminish the growth of the affected region and check the arterial supply to them, it would be necessary to ligate either the common iliac artery, or to put separate ligatures on the common femoral, and on the branches of the internal iliac which emerge at the great sciatic foramen. Ligation of the former vessels would be the most thorough method, but probably the most hazardous. If the femoral artery alone were tied, the pubic would probably enlarge, and the disease would then be increased in the penis, while it receded in the extremity.

Before resorting to ligation, it would be well to prepare the patient by rest in the recumbent posture with the foot well elevated, so as to diminish, if possible, the engorged state of the limb, in order to prevent a stasis of the fluid after the operation. At the same time, to prevent the possibility of gangrene, a tourniquet may be occasionally applied to the common iliac of the affected side, to impede the flow of blood through it, and to promote increase of size in those vessels upon which the vitality of the limb would depend. As regards the necessity or time for the operation I should be guided by the effect of the disease upon the health of the child. If the common iliac were to be tied, it would probably be well to favor the flow of the chylous discharge, so as to diminish the whole mass of the fluid in the limb at the time of the operation, and thus lessen risk of gangrene."

Dr. Cholmeley and Mr. Barwell, in the debate before the

Clinical Society (London) which took place when the case of Day was presented to the Society (Clinical Society Trans., vol. ii., page 104), expressed the opinion that the enlargement was due to excessive arterial supply, and suggested that the proper treatment would be to apply continuous pressure to the femoral artery.

Diminution of the supply of arterial blood, either by ligation or continuous pressure of the principal arterial trunk, is probably only applicable to those cases where the cause—redundant supply of nutrient material—is clearly established. It may, however, prove of some value as an adjuvant in those cases where venous stasis is the essential factor, but the benefit would hardly compensate for the evil effects which are to be anticipated. In those cases where lymph stasis is the consequent result of interruption to the lymph stream it would be futile.

In this connection the following observations of the temperature, pulse, and respiration in cases of ligation of the femoral artery are of interest. In the first case the temperature was taken by placing the bulb of the thermometer between the great and little toes, the feet having been previously uncovered for some time. It was taken at 10 A.M. and 6 P.M.

Date of Observation.	Temp. of Diseased Extremity.	Temp. of Healthy Extrem.	Temp. in Axilla.	Pulse.	Respiration.
Before ligation, January 27, Morn.	35.8°C.	35.5°C.	37.3°C.	84	20
After ligation, " " Eve..	23.6	35.3	37.2	84	22
" " January 28, Morn.	26	34.1	37.3	96	26
" " " " Eve..	32.3	36.4	38.1	100	28
" " January 29, Morn.	32.3	36.4	38.1	100	28
" " " " Eve..	37.1	38.2	38.7	108	28
" " January 30, Morn.	30.4	34.5	37.1	100	24
" " " " Eve..	35.8	36.9	37.9	100	28
" " January 31, Morn.	35.2	36.2	37.4	92	26
" " " " Eve..	35	36.4	37.7	88	24
" " February 1, Morn.	34.3	36	37.3	76	24
" " " " Eve..	36.3	36.8	37.2	80	22
" " February 2, Morn.	33	34.4	37	76	20
" " " " Eve..	34.5	34.8	37.2	84	20

The following observations were made in a case in which obstructive heart circulation was probably a factor concerned in the production of the lymph stasis. After an experimental injection of sodium chloridum into the tumor by Prof. Bryk,

which was followed by abscess formations, the femoral artery was ligated immediately below Poupart's ligament, effecting complete reduction of the tumor and return of the normal condition of the skin, but followed by beginning relapse in six months. If the supposition be correct that the venous stasis occasioned by cardiac obstruction was the chief factor of causation, the beneficial, though not permanently curative, effects of ligation of the arterial trunk is exemplified:

Date of Observation.	Temp. of Diseased Extrem.	Temp. of Healthy Extrem.	Temp. in Axilla.	Pulse.
Before ligation, March 26, Morning.....	35.5°C.	35° C.	37.5° C.	70
After ligation, " " Evening.....	25.8	35.6	37.2	60
" " March 27, Morning.....	36.1	35.3	37.8	115
" " " " Evening.....	36.5	36	38.2	104
" " March 28, Morning.....	35.1	36.5	37.7	115
" " " " Evening.....	34.8	35.8	37.9	108
" " March 29, Morning.....	29.7	34.4	37.5	108
" " " " Evening.....	26.1	32.8	37.4	92
" " March 30, Morning.....	25.9	33	36.8	83
" " " " Evening.....	32.2	32.3	37	90
" " March 31, Morning.....	32.4	32	36.4	80
" " " " Evening.....	34	35.3	36.8	74
" " April 1, Morning.....	33.3	30.5	36.8	70
" " " Evening.....	33.9	31	37.1	68
" " April 2, Morning.....	32.9	32.7	36.7	74
" " " Evening.....	32.2	32.5	36.9	74

The third observation, made by the same distinguished surgeon and previously referred to, was in a case of ulcerous elephantiasis of the left leg and foot of several years' standing, in which partial, but stationary decrease of the tumor was effected by rest and elevation of the limb for eleven days. A more marked reduction and commencing cicatrization followed the ligation of the femoral artery. The patient, a "servant-girl, aged 20, had suffered from her ninth year with frequently recurring attacks of erysipelatous inflammation of the left leg and foot, which in her sixteenth year was complicated with an ulcer on the inner side of the ankle, followed by increased enlargement of the leg and foot, and the formation of thornlike excrescences on the thickened and callous skin. The heart was enlarged transversely, the area of dulness extending from the edge of the sternum beyond the nipple, and was accompanied by a systolic murmur at the apex; the liver measured the

width of three fingers below the arch of the ribs; the spleen as well as the sub-maxillary, and especially the left inguinal glands, were enlarged and indurated."[1] The history of the case, as well as its course, apparently located the origin of the elephantiatic development in the lymphatic system. In view, however, of the facts presented (see p. 101 et seq.) the incompetency of the mitral valves cannot be excluded as a factor in producing the lymph stasis.[2]

Date of Observation.	Temperature of Affected Extrem.	Temp. of Healthy Extrem.	Temp. in Axilla.	Pulse.
Before ligation, Nov. 30, Morning...	35.9° C.	34.2°C.	36.6°C.	80
After ligation, " 12–3 P.M...	36.2 (???)	29.4	37	92
" " " 6 P.M...	26.3	34.7	37.8	96
" " Dec. 1, Morning...	34.8	35.5	37.3	90
" " " Evening...	36	37.7	38.5	106
" " Dec. 2, Morning..	35.7	36.4	37.1	100
" " " Evening...	35.7	35.4	37.2	90
" " Dec. 3, Morning...	36	36.1	36.9	100
" " " Evening...	36	36.6	37	114
" " Dec. 4, Morning...	35.7	35.4	36.5	100
" " " Evening...	35.2	35.4	37.7	96

These observations exhibit the harmlessness of the operation. In each case the temperature of the affected limb fell considerably within the first twelve hours after the ligation of the vessel, and in the succeeding twelve hours there was a very marked elevation, whilst during the same period the temperature in the axilla was but moderately influenced. The collateral circulation was quickly established.

In the foregoing review of the treatment, many additional citations might have been introduced, illustrating the several methods of treatment, but the object has been to present the subject in as succinct a form as possible, rather than to give undue prominence to any particular plan. The inadequacy of individual experience in the management of these comparatively rare affections remands the various proposed methods of treatment to further investigation and more enlightened observation, for which, it is hoped, the opportunity is now presented.

[1] Reprint from *N. O. Med. and Surg. Jour.*, p. 140, case 57.
[2] Ibid., p. 125 et seq.

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